

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XL
Number 18

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, MAY 1, 1919

Fifteen cents a copy
Three dollars a year

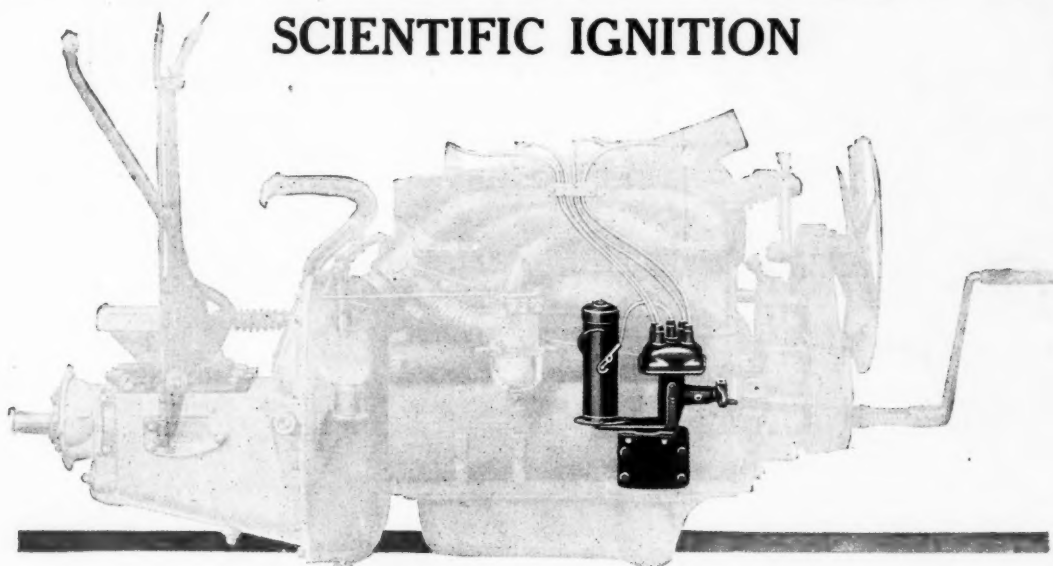
GENERAL LIBRARY
MAY 3 1919

Simple in Construction — Unfailing in Performance

UNIV. OF MICH.

ATWATER KENT

SCIENTIFIC IGNITION



Type CC Magneto Replacement System on Maxwell Motor

TYPE CC Magneto Replacement System fits snugly on the base provided for the magneto. Very little work is required to install it.

The system is so simple that it rarely needs attention.

Quoting from a car owner's statement: That after 41,000 miles of operation, he thought the system had better be overhauled, although there was really nothing the matter with it that he could discover, as it was sparking as regularly as the day it was installed (several years ago).

Write for copy of our booklet, "Selling Atwater Kent Ignition"

ATWATER KENT MFG. WORKS *Philadelphia*

SEE YOUR DEALER OR WRITE TO 4938 STENTON AVENUE



**The Most Important Question:
"Has it a Red Seal Continental Motor?"**

With the buyer of a motor truck or passenger car today, the time for experimentation is past—he demands a vehicle of *proved* worth.

Naturally, therefore, his first thought is of the motor. And the most important question is:

"Has it a Red Seal Continental Motor?"

He knows that a motor which for more than a decade and a half has stood the test of service, in hundreds of thousands of automobiles and trucks, under the most exacting demands of peace and war, is a motor upon which he can absolutely depend.

The Red Seal Continental Motor has stood *this test of past performance*—in power, in speed, in economy, in all-round reliability. As a consequence, more than 160 successful manufacturers of automobiles and trucks have selected this motor—and upwards of 15,000 dealers have approved their judgment by handling Continental-motored cars. Tens of thousands of owners will have no other motor.

Look for the Red Seal on the motor in the car or truck you buy—it's your unfailing guarantee of motor dependability.

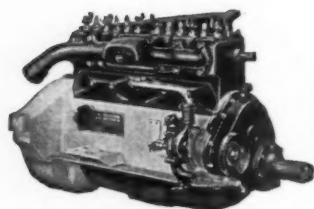
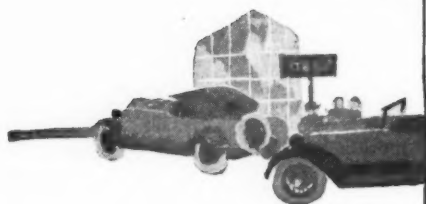
CONTINENTAL MOTORS CORPORATION

Offices:
Detroit, Michigan

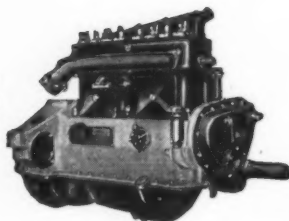
Factories:
Detroit—Muskegon

Largest Exclusive Motor Manufacturers in the World.

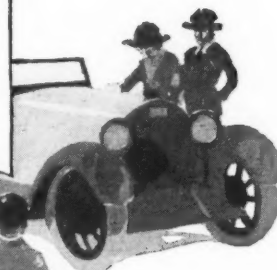
**Continental
Motors**



*America's Standard
Passenger Car Mo-
tor. Look for the
Red Seal Name-
plate.*



*America's Standard
Truck Motor. Look
for the Red Seal
Nameplate.*



AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XL

NEW YORK—THURSDAY, MAY 1, 1919—CHICAGO

No. 18

Less Government Interference

Is the Demand of Foreign Trade Convention

Imperative That Ships Be Sold Soon to Americans—Cannot Look to Allies for Export Business—Best Opportunities in Latin America and Other Neutrals—Reciprocal Trade Essential

By Allen Sinsheimer

CHICAGO, April 25—Prompt sale of the American merchant marine to Americans and speedy return of the railroads to their owners are vital to the success of our export trade.

Less Government ownership and interference with industry are necessary to insure success to America's foreign commerce.

These major conclusions and a unanimous demand for a prompt statement by the Government of its policy toward industry were dominant features of the Sixth Annual Foreign Trade Convention held here this week. Widespread applause attended every demand for less Government interference in business.

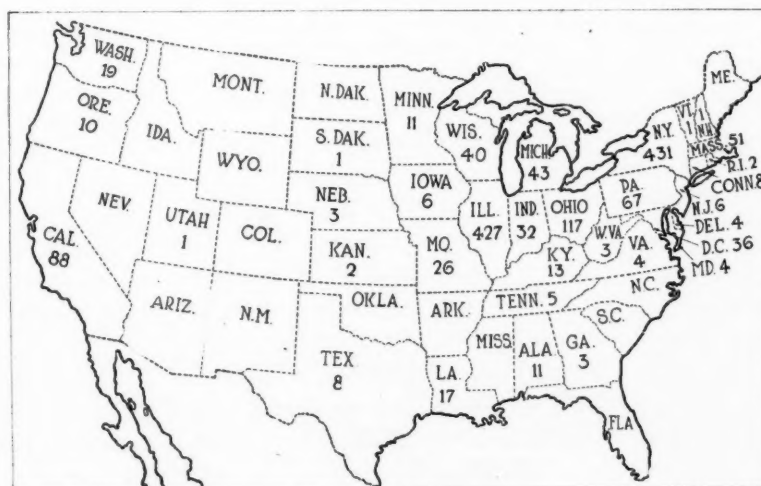
That we cannot look to our Allies for export business, that

we must purchase raw materials from the neutrals with whom we do an export trade, that Latin America and some of the European neutrals and the Orient will form the chief outlets for our export, that cash against document at New York is harmful practice

and poor business, and that we may look to Germany for keen competition in the neutral trade are others of the most vital developments of the convention.

The Allies are not going to buy more than they absolutely have to from the United States. It would not be good business for either at this time if they did. Their policy is one of self-defense and they must buy little and sell much for the next 3 or 4 years if they are to stabilize their financial positions, and this in turn will eventually mean more speedy repayment to the United States of the outstanding war debts.

Only legitimate and stable foreign trade is built on a reciprocal basis—we must buy from those who buy from us. We must purchase raw



Number of delegates from the various States present at the National Foreign Trade Convention. In addition there were many from abroad. Almost every country in the world was represented by a delegate from its American agency

materials from those nations to whom we sell finished products. This means that they will have the cash to pay for our exports and it insures a sound exchange basis. We cannot now buy raw materials from our Allies. They need them all and more for reconstruction. We can buy raw materials from the neutrals, and it is to them in turn we must look for export business.

Latin America, Scandinavia and Norway and the Orient will all be excellent markets for American products in the opinion of the various speakers. Latin America, which has been buying from us on a greatly increased scale since the outset of the war, will undoubtedly continue in great part to import American products. In some few instances Great Britain, France and Italy may undersell us, but in the main, and particularly in the automotive field, we will undoubtedly hold our own and increase. The readiness of American automotive manufacturers to supply now and our quantity production and low prices are important factors.

The Scandinavian countries are friendly to the United States as a result of the war. The British censorship seriously affected the feeling toward her, and it was said at the convention that the Scandinavian manufacturers are looking to the United States for many commodities.

Prosperity through the war has greatly increased the buying power per capita of the Orient, and we can secure cash there for our products and in addition give credit quite freely and in safety.

These are fields that the Allies cannot well sell to for some time to come and give promise of great and successful business for the United States.

Consequently, with the debt of France so great that it is about \$1,000 per capita, with Italy laboring under the burden of debt and minus natural resources of iron and coal, and with Great Britain forced to control her imports until she can well establish her exports, American industry should for the time being give up expectations of a large export business to those countries and concentrate its energies on the neutrals, and particularly those from whom we can buy raw materials for conversion to finished products.

The practice of selling for cash against document at New York means first a continuation of the gold stream that has been pouring into the United States and upsetting seriously the financial exchange, and secondly, in view of the money markets of the world and the need for us to extend long credits, it is a bad business principle to-day.

German Competition

Because the hatred of neutrals will likely be less than that of the Allies, Germany plans her first commercial onslaught toward the neutral countries, and the United States should prepare to meet German competition possibly more strenuously than the competition of the Allies.

France, as was told at the convention, is to-day in dire need of long credit. The French nation has lost \$7,000,000,000 worth of buildings, \$12,000,000,000 of agricultural and industrial land and facilities and almost \$5,000,000,000 in other properties and cannot hope to pay off her indebtedness or pay cash for commodities for years to come. She does hope to some extent to pay for imports with raw materials, as, for example, potash, of which she has 300,000,000 tons secured by the return of Alsace-Lorraine.

German Export Trade

German export trade, it is thought, will be directed toward the neutrals and that we may look for keen competition from her. The German manufacturers fear that the hatred of German products will continue for some years to keep them out of the markets of the United States, Great Britain, Italy and France, and consequently they look to the other countries.

That all export problems and our big national problems must now enter into the consideration of every individual industry planning foreign trade, that the Webb-Pomerene Act will, without question, be the biggest sin-

European Neutrals' Trade

They offer our best trade areas. Neutral countries in Europe are favorable to U. S. A. trade. They have grown wealthy during the war. Their shelves are empty. Credits must be extended and cash against documents is not the best method of building up foreign trade. Exclusive selling agencies should be placed in each country.

gle factor for development of American trade, that direct selling is the only logical method for selling abroad, that foreign advertising can be successful, but requires most careful handling, and that the shipping situation must soon be cleared up and lower shipping rates set were other important developments of the sessions.

Direct selling in export trade, discussed an entire afternoon in the convention by over 500 delegates, is the only satisfactory way to carry on export business, according to the opinions of experienced concerns. Many of the speakers who have been in export trade for 20 years have just recently returned from Europe, where they have been studying post-war conditions.

By direct selling is not meant sales to the consumer by the maker, but rather the operation of his own selling organization by a manufacturer which can be done either by:

1. Branch houses.
2. Representatives and jobbers.
3. Exclusive agents.

The manager of your export business should be an American familiar with American manufacture and business, and his staff should be native to the country in which he is located. Branch houses allow for better control of the stocks on hand, better service and cultivation of the buyer to a higher degree than through a foreign agent. Advertising, too, can be handled more advantageously through a branch house.

Where an exclusive agent is used he should be well established in the trade engaged in and loyal to the United States. Generally the longer such an agent is established the more reliable he becomes. He should be assisted when first starting by one or two men sent by the manufacturer who can aid him with sales and advertising help.

Many local problems arise in connection with direct selling. In England and France sales are often very small and good representation is very necessary. In the hardware industry sales to consumers often average \$2.50, which emphasizes the need for competent representation. Selling costs in England and France are 15 per cent higher than in the United States. Direct sales in Latin America demand a thorough study of the people.

Practically a unanimous approval and optimism prevailed with regard to the Webb Act allowing combines for foreign trade, and it was stated frequently that it would be the most vital aid to building up American foreign commerce by allowing our manufacturers to combine and compete fairly with foreign trade. It was also the

general opinion, with few exceptions, that the various legal interpretations that are possible will not be used to obstruct foreign commerce and that the bill, as it stands, is of particular significance, since it is the first direct concrete and co-operative aid that our Government has extended to industry.

That our shipping bottoms will be ample to care for our foreign trade once they are safely in the hands of American owners was a universal opinion. Shipping rates, it was also said, will not be reduced until after the shipping situation is settled, and until then must continue to some extent to interfere with export trade.

Advertising abroad must be done directly by the manufacturer and not through a dealer, to secure the most successful results, and can be made most profitable if it is properly and carefully handled. Too many manufacturers have plunged either with too little or too much money into advertising campaigns in the various countries without first making a careful survey of the field and inquiring into the mental and material conditions of the people, their customs, peculiarities and systems. No two countries can be sold on the same plan of publicity. Each must be surveyed and analyzed separately. The population, buying power per capita and all local conditions must be considered.

Successful Advertising

Advertising can, however, be done most successfully if sufficient attention is given the subject and the appropriations are properly divided and expended through some advertising agency familiar with the countries in question and capable to judge the proper media.

One of the best examples of how foreign trade differs to-day from that of yesterday, and means that the export manager of an automobile factory, for example, must also consider numerous of our big national problems and many other exports that are far removed from the automobile industry, lies in the usual war condition that has set up a situation calling for special care with regard to every material and product. We will have to give consideration to every item for export separately and intensively. Thus the statements made that raw materials should be worked at home and not exported, though in the main form a sound conclusion, met with a reasonable contradiction in the discussion by Fred I. Kent, vice-president of the Bankers Trust Co., who stated that the shipments and prices of raw cotton from the United States to Great Britain will play a most important part in

The Webb Law

A practically unanimous optimism and approval of the Webb Law prevailed. Confidence was expressed that the bill is the most important single factor for the development of export business. Majority of opinions were that the Government will not interpret the provisions of the bill from a strictly legal viewpoint to create pitfalls for the combines organized under it unless they engage in dishonest or unfair practices. The tendency of lawyers to emphasize its legal frailties was decried.

all of our export business to that country and in its imports to us and in our financial relations.

Great Britain, he said, will first have to control her imports until her exports are re-established. A flood of imports now against her much decreased exports will only serve to send her further lower in the financial scale and tend to make her position still more unstable. She will have to ship to the neutrals to whom she is in debt before she ships to the countries that owe her. And it will take her a long time to pay her American indebted-

ness, because to keep her foreign commerce alive she must buy raw cotton from us in huge quantities and at fair prices. This will continue her as a debtor nation to the United States. Great Britain must have raw cotton in order to make textiles for China, India and other countries. These offset her imports from those countries. If we do not sell her the raw cotton at normal prices Great Britain will not be able to compete abroad with her textiles, be unable to pick up her world trade rapidly and possibly ruin her foreign commerce that is now practically vital to her future. If we do sell raw cotton at fair prices to England it means that her world trade will revive rapidly, she will be able to meet her American obligations more quickly, will increase her financial income, enrich her and increase our exports to her and allow her to speedily pay off her war indebtedness to us.

Consequently in this instance it appears that the export of automobiles and the relaxation of the existing embargoes and curtailments against our automotive products is directly influenced by this problem of cotton. Sufficient cotton at fair prices will apparently mean earlier relaxation of restrictions against American automotive commodities.

France's Economic Error

France, said Mr. Kent, is making an economic error in her attempt to make all possible products within her boundaries instead of manufacturing those which her climate, geographical situation and resources best warrant. Continuance of her present course, he believes, will tend to further diminish French foreign trade because no country can manufacture for export without buying abroad for manufacture, for any length of time and do it profitably. The French indebtedness to us would be more quickly reduced if she would work to establish her reciprocal foreign trade instead of attempting only to develop export business.

The extreme importance of our various national problems in their relation to foreign trade was emphasized particularly in the matter of labor and of Government ownership. The deep feeling against continued operation of the railroads and merchant marine by the Government was evidenced frequently by the widespread applause of every statement favoring the return of the roads to their owners and the sale of ships to American concerns and individuals.

The inability of export managers to make prompt deliveries because of existing railroad conditions was stated often. The present high costs of freight transport are an important

Opportunity for Oriental Trade

The Orient, prosperous as a result of the war and untouched by the post-war problems, offers important opportunities for American export trade. We can sell for cash and we can purchase raw materials in the Orient to be manufactured into products that can be resold there. This means a stable financial condition of exchange. American manufacturers should concentrate their energies to a large extent now on the development of the Oriental trade.

Competition by the Allies

A healthy competition for foreign trade by Great Britain, France and Italy against the United States will do more to create a stable financial world condition than a widespread commercial victory by our Government. We should welcome the competition. Apathy on the part of any of the Allies should be decried. Great Britain will be probably the first to enter into a keen competition, but her entrance cannot be expected for some time.

barrier to competition with foreign firms in prices.

That the governmental policy of continuing war contracts now for the purpose of providing workers with labor and wages was proclaimed most likely being fair, but, it was stated by Homer Ferguson, president of the Newport News Shipbuilding Co., the system of maintaining the cost-plus contracts and the consequent high war wages fixed by the Government was unstable and unsound. Many of his shop workers he said had filed income taxes ranging between \$5,000 and \$9,000 dollars for last year and were now earning between \$100 and \$175 a week engaged on work that is being provided solely to keep them employed. This he and others pointed out tends to keep up our entire wage scale and consequently our selling prices and is seriously harmful to our competition in the markets abroad. It means such high prices for ships, for example, that unless a great part of the cost is at once written off, the ships cannot operate profitably and must work at a great loss even at prices far in excess of foreign scales.

Return of Ships to Private Owners

Unanimous approval was expressed for some method whereby the ships now owned by the Government would be sold to American firms at reasonable prices and on reasonable terms.

The present unstable labor condition was referred to by every speaker and practically every discussion terminated with a denunciation of the bolshevistic tendencies, now so threatening and tending to prolong the existing labor problems and consequently increasing the difficulties of export trade.

The need for governmental declaration of its future policy toward business and expression that Government interference with business should cease were statements made frequently. Edward N. Hurley, speaking at the banquet, emphatically denounced Government interference

and the present tendency of many business men to seek too much Government co-operation. "Business," he said, "should not get into the habit of relying upon the Government to solve difficulties which can be overcome by ordinary business skill and honest methods." He also demanded that our Government should state its position and policy toward industry and labor clearly and promptly, and referring to the Webb Act which many lawyers speaking at the convention claimed is too full of legal complications and threatens to create a quagmire in which industry will find itself mired, he stated that "most business problems require common sense rather than legal reference and require good judgment and honesty of purpose rather than reference to the courts."

That the Webb Act is important not only as the first concrete evidence of our Government's intention to aid business, but also as a practical vehicle on which our foreign business can ride to prosperity speedily and wholesomely was the expression of the majority of business men and some lawyers present.

There is no question in the mind of the Federal Trade Commission, stated John Walsh, former chief counsel of that body, but that Congress intended the act primarily as a method to promote foreign trade, as is indicated in its title, "An Act to Promote Foreign Trade and for Other

The Balance of Trade, and Exchange

The pound sterling, released from a fixed rate of exchange, is losing in value, and in consequence imports into Great Britain take on an added cost to the consumer. It is prophesied the pound sterling will decrease to \$4. This means an 18 per cent increase at least in the selling price of American commodities in Great Britain. With the apparent sanction of the British Government to the decreased value of the pound sterling it can be assumed that this action is intended to construct a protective wall against imports to take the place of a tariff which Great Britain lacks.

Eventually this policy will stabilize exchange rates and create normal trading and finally permit a healthy American-British foreign commerce.

Our Allied Trade

We may be out of European trade for a time, but when Europe becomes normal there will be greater trade opportunities than before the war. Our Allies must control imports until they re-establish export trade. We must prepare to take European securities and buy their merchandise de luxe in return for our trade—there is something more than profit in foreign trade.

Purposes," and the Commission, he stated, does not intend to quibble over every possible legal interpretation and will insist only that our foreign business under the Webb Act will be fair and honest. The passage of the bill, he said, indicates the Government's desire to aid foreign trade development and the provision included in the bill providing that when a concern violates its intent the firm will first receive notice of such violation together with suggestions and recommendations for changing its policy or structure is itself another indication that the Government has the highest respect for American business integrity and has adopted a policy of co-operating with rather than persecuting our business world.

No Obstruction of Business Intended

He stated that more than 80 combines have already taken advantage of the Act and include all varieties of business. The Commission, he stated, after an exhaustive study of the bill found it was unreasonable to suppose that Congress had intended to obstruct our foreign commerce and he defined the Act as a means of promoting export trade along fair and legitimate lines and said that manufacturers following honest principles would find no Government interference because of possible legal variations.

"When the Commission," he said, "has reason to believe that an export trade association has committed an act or made an agreement which is in restraint of trade within the United States or which is in restraint of the export trade of any domestic competitor of such association or where such association has entered into any agreement or done any act in this country or elsewhere which artificially enhances or depresses prices in this country of products exported by the association or where the same substantially lessens competition in this country or otherwise restrains trade therein," which are the various restrictions of the Webb Act, "it will conduct an investigation." If it concludes that there has been a violation of the law it may make recommendations to the association for readjustment of its

business to accord with the law. "Thus for the first time in our history a penalty is not provided for violation of a law of commerce but in its stead is a recommendation for readjustment which may be acted upon by the Attorney General if not complied with. Congress evidently recognized by the passage of this provision that business men are generally anxious to maintain the highest ethics of trade, that violations are seldom international and will be promptly corrected when attention is called to them."

Import trade by a combine under the Webb Act, he stated, is not permitted. But, he said, Congress must have had in mind, when passing the bill, the many powers that are granted a corporation under its charter, and it is evident that a Webb combine can engage in the operation of wharves, warehouses, elevators, ships and many other activities incidental to its export trade. Two forms of organization are most common under the bill, one being the corporation formed of the various manufacturers each as stockholders, and the other being merely a simple agreement of a number of manufacturers to engage in export business.

A more pessimistic view was taken by L. H. Bissell of Chadbourne, Babbitt & Wallace, who stated the bill was filled with pitfalls for any combines formed under it. The problems he presented, however, he appeared to answer quite completely and satisfactorily. These were chiefly of that variety that come under the name of strictly legal interpretations. Suppose a combine, he asked, of American producers ship so much of their production abroad that they diminish the home supply, forcing up domestic prices, would not this be a violation of the Act which prohibits enhancement or depression of prices and restraint of trade? He answered this by stating that if manufacturers agreed upon a reasonable amount of their product for

Shipping Rates Remain

There is no likelihood of shipping rates declining until the general shipping situation is clarified and until the merchant marine of the world reverts to a normal condition. Private ownership of American ships now controlled by the Government will be a quick step toward stabilization of shipping rates.

Best Selling Methods

Direct selling, which means foreign sales through a direct representative, either in the form of a branch, an agency or a jobber, who should be an American citizen, is the best method for promoting foreign trade. No two countries should be placed under one branch. Under the American executive there should be a staff of native salesmen.

export prior to engaging in export trade each year there would probably be no interference by the Government regardless of the effect on price or trade at home.

Can a combination of American manufacturers undersell another American combine also under control of the Webb Act or any American exporter abroad, without interfering with the restraint of trade clause, if the foreign underselling ruins the competitors' business at home? was another question presented. It was answered that any underselling abroad would be allowed so far as it was honest and fair and based purely on production and sales costs.

That Webb combines could also sell products cheaper abroad than at home was thought permissible provided that it was done to meet foreign competition, but would not be allowed if without justification.

He also defined "foreign nations" as used in the Act to mean that the Webb concerns may sell to the Philippines but not to Hawaii, Porto Rico or Alaska, and the use of the word "navigation" he interpreted as "commerce" and allowing for both import and export business by the combines under the Act. He did not believe American manufacturers could manufacture abroad for export under the Webb combine plan but could properly assemble parts shipped from this country abroad for export sale. The combines, he also stated, could not sell materials in this country even though for

manufacture here for export, but might be allowed to sell finished products to concerns in this country for export by them.

Allen Walker of the Guaranty Trust Co., who, it was stated, has organized 90 per cent of the combines now operating under the Webb Act, is very optimistic and assured that the Federal Trade Commission does not intend to restrain American manufacturers except where it becomes seriously necessary. He stated that American combines organized for export and representing similar industries, should be careful to avoid difficulties which could arise by the playing off of one combine against the other by foreign competitors. His fear of this possibility is so great that he urges the creation of single large combines to represent an industry rather than several smaller ones, and pleaded for abolition of petty jealousies between manufacturers.

The general impression gathered, however, from the various discussions marks the Webb Act as a most important aid to the development of American foreign trade, and the viewpoint taken, aside from that of a few lawyers, can be said to have been very optimistic.

The unpegging of the pound sterling and its consequent decline to \$4.60, and the general unstable exchange condition, was a matter of considerable concern. Predictions were made several times that the pound sterling will likely go down to \$4 and that Great Britain is planning the decline as a sort of protective measure to take the place of a tariff. The decline of the pound sterling has the effect of increasing prices of all products imported, since the importer must pay 4 per cent more (on the basis of \$4.60) to the manufacturer from whom he imports. This means that the British public will pay from 4 to 10 per cent more for the commodities imported and has the effect of decreasing the imports. A decline to \$4 would have the effect of raising the price paid to American manufacturers by 18 per cent. For ex-

Government Interference Dangerous to Industry

"Combinations of Government with industry are as dangerous as Church with State," said Edward N. Hurley, striking one of the major topics of the convention. There was widespread approval of every demand for the return of the railroads to their owners and the sale of the American merchant ships to American individuals. Denunciation of the present practice of the American business man to seek too much Government aid was made frequently.

Parcel Post Trade

Great Britain has parcel post service to 195 countries and U. S. A. to 94. To become a truly great exporting nation we require the steady and unending aid of an adequate parcel post system. Special attention must be given to small trial orders. Express charge on a 3-lb. package from Chicago to Johannesburg is \$15.40, and parcel post from London to Johannesburg for the same weight is 84 cents.

ample a truck now selling for export at \$2000 would bring the American maker 500 pounds sterling and the importer would be forced to sell the truck for at least \$375 more than the usual retail price, and probably at \$500 to \$1000 more to make up the extra interest charges, etc.

Consequently the exchange situation is another of the many matters that will affect our exports and is another argument for the establishment of American banks abroad both for simplification of payment, decrease of costs of payment, and for the maintenance of sound exchange rates.

Although many American fabricated products are expected to decline in export with the re-entry of Great Britain in the field, chiefly because British prices are lower, as, for example, with brass goods which Great Britain sells for 20 per cent less, it is not expected that this will be the case with American automotive products; because while they are fabricated commodities they are in an exceptional position due to the fact that American makers are able to supply now and have long been established on a quantity production and low price basis. The automotive industry consequently is one that should be putting its best foot forward, engage in intensive foreign merchandising and make every effort for not only holding but increasing its trade.

Commercial education for foreign trade was given particularly close attention, and emphasis was laid on the need of a good general education as a basis for all members of the export organizations. Considerable discussion ensued with a decided tendency to favor the use of American salesmen abroad and particularly men speaking plain American Eng-

Foreign Advertising Successful

Foreign advertising is not a matter of dollars, but of intelligent survey and analysis. Small or large sums can be successfully used for advertising, either in American trade, export publications or local newspapers or weeklies, provided the advertisements are properly written and illustrated and conform to the customs, peculiarities and systems of the individual country for which they are intended. No two countries can be successfully sold by any one advertising plan—each must be separately surveyed and analyzed.

Latin America

Latin America offers the greatest field for export trade. European makers for many years will not be in a position to meet the demands in South America and Central America. All have made money during the war. We must buy their raw materials in return for our manufactured products. Crating instructions must be followed more closely for Latin America than any other country.

lish, possessed of average American honesty, application and intelligence, who, it was stated, would, when backed with fair prices and the best goods, easily out-sell the men who ape foreign manners, customs and peculiarities. Men should be taken from within the home organizations, it was stated, to fill vacancies in the export departments, and should be those who can bring with them thorough knowledge of the production system and home sales plans of the company.

The use of foreign salesmen was decried. Many American concerns lost their export trade organizations with the beginning of the war because they had been employing foreign salesmen.

James W. Hood, president of the Allied Machinery Co., pointed out that England, Italy, France and Germany have never entrusted their export business to foreigners and said American industry must lay a foundation of complete independence from every other nation in all matters involving export trade.

He stressed the importance of developing foreign trade for those of our products which are specialties and believes these will find a ready market the world over. The importance of watching the stocks maintained in the foreign branches and agencies and of turning these at least three times a year, he said, cannot be exaggerated.

Discussion of the use of trade acceptances in export business developed that very little has as yet been worked out so far as foreign business is concerned. The only use of foreign trade acceptances has been made in the Orient, where the concerns draw on the mercantile distributors in the United States. "There was no reason," it was said, "developed to show that foreign trade acceptances cannot become more universally used nor why trade acceptances originating here and drawn on companies abroad should not find their way into the discount market."

Attention of all American industry to the important relation of airships to export business was demanded by Professor Hiram Bingham, lately a colonel with

the A. E. F., connected with aviation. He told of the discovery of helium, which a few years ago cost \$1,600 a cubic foot to produce as compared with 10 cents a cubic foot now, that to supply the Army prior to the new discovery would have cost \$36,000,000,000, as compared with \$200,000 now. Great Britain, and especially the Vickers Co., Ltd., are preparing to utilize the new discovery and this country should not neglect it, especially as the supply of helium is in the United States.

England is already building huge dirigibles, arranging ports, light houses and routes, and unless American industry awakens it will find the British manufacturer going to Pekin or Calcutta, as the case may be, in 3 or 4 days to close a contract that American makers will lose because it will take them 3 or 4 weeks to make the same journey.

Great Britain beat the United States in the selection of coaling stations for its marine, and forced us to take what was left, and we will find ourselves in the same situation with regard to aviation if we do not promptly recognize the value of the new discovery.

The use of advertising for promoting export trade was declared entirely feasible and highly successful by several speakers. The use of American trade export publications, it was stated, is particularly successful, and products ranging from high priced machinery to 25 cent cans of talcum powder are being successfully sold by export papers. The use of foreign local newspapers and weeklies is successful, although Sunday newspapers have not the power they possess in the United States.

Billboards, handbills, export publications, local papers, postal bulletins, street

Foreign Trade Dependent on Credit Elasticity

A flexible system for the handling of foreign finances is essential to the welfare of American export, for our foreign trade cannot expand without an elastic system, allowing for simple and easily extended long term credits. We must have a system that gives individual consideration to the customs of individual countries. The use of trade acceptances in the foreign field will simplify our credit problems. Complete machinery for collection and distribution of foreign credit information and for financing transactions and for handling payments is now available.

car and railroad station advertising has all been found profitable, stated Frank A. Arnold of the Frank Seaman Company. He told also that the advertising agencies have awakened to the fact that they must be able to tell prospective advertisers all details of foreign countries, about their population, customs, and buying power per capita. To analyze foreign advertising, for example in Latin America, it is essential to consider that 50 per cent of the people are illiterate and can be best appealed to by photograph and illustration.

Sense Appeal Successful

The sense appeal has been found particularly successful, and the appeal to sight by means of ads portraying automobiles with gorgeous upholstery and brilliant finish has been profitable.

Good advertisements cannot be written in English and translated. All agreed on this. In such instances they lose their vigor and force. They should be written originally in the language of the people for whom they are intended. Native artists can better illustrate the advertisements. Color should be emphasized, and the Latin American artist knows how to do it. Trade marks should be played up, price should be prominent and all text or descriptive matter should be brief.

The use of cut-outs, calendars, postcards, souvenirs and attractive illustrative trade literature to be distributed by the local dealer has been found an excellent plan. The greatest stress, however, was laid on export trade publications, which it was stated the natives regard as a monthly or weekly catalog of the American products of the industry represented, and which they regard highly in the case of reputable papers.

The use of local newspapers in Argentina, Brazil, Peru, Australasia, South Africa and the Far East was found profitable by Howard G. Winne, Johnson Overseas Co., who stated that billboards, posters, and handbills were liked in China, posters in Argentina, railroad station advertisements in Uruguay and Argentina, and street car displays in Brazil. He emphasized the need for manufacturers to spend their own appropriations and not send them to dealers for their use for advertising.

Advertising in Foreign Countries

Numerous questions were asked as to the best means for dividing appropriations through the various countries of the world, and all were agreed that in the case of a virgin field it is essential to first make a theoretical survey and an arbitrary appropriation which can later be regulated by results. The keynote of the discussions appeared chiefly to be that a manufacturer planning to advertise abroad should do as he would in his home market—make a survey, analysis, secure experts, use the authoritative trade publications as a medium and for advice, consult advertising agencies, and keep free from uninformed so-called foreign experts.

FOREIGN TRADE REMARKS BY BIG MEN

We are badly inoculated with self-interest in relation to foreign trade policy and imports.—E. A. BRAND, *Tanners' Council of U. S. A.*

Europe's action in imposing restrictions is dictated by a policy of self-defense. She will buy little and export much in order to stabilize her position.—JAMES E. FARRELL, *president United Steel Corp.*

With the decline of foreign commerce decay sets in.—EDWARD PRIZER, *president Vacuum Oil Co.*

We are eager to sell goods abroad, but this is upon the assumption that we will get something for them. As individuals we want cash, but a nation's sales are never made for cash and cannot be.—FRANK A. VANDERLIP, *National City Bank.*

Business should not get into the habit of relying upon the government to solve difficulties which can be overcome by ordinary business skill and honest methods.—EDWARD N. HURLEY.

If you want foreign trade you must go after it. You cannot get it by sitting in your office and looking at a map of the world.—JOHN J. ARNOLD, *First National Bank of Chicago.*

Trade is reciprocal business in and out. Sales only do not mean trade. It has to work both ways.—E. J. PARKER, *The Parker Co.*

Enlargement of our maritime insurance companies was urged in a discussion of this subject, where it was told that many foreign customers, particularly in Latin America, preferred to insure themselves through British companies or other foreign concerns because they earn a commission that they do not secure when the American exporter insures through an American company. The placing of insurance with Lloyds of England was decried because it places our ships under their control and forces our shippers and ship owners to comply completely with British inspectors' demands.

Free Ports

The feasibility of establishing free ports similar to that of Copenhagen was discussed, to permit the importation of materials that could be manufactured into finished products at factories located within the free zone and then exported without incurring duty or tariff. A sort of manufacturing zone, in other words, located within a district similar to the Customs districts where goods are held in bond, was advocated. The history of New York's development and its difficulties to secure legislation for completion of a tunnel under the Hudson and East Rivers, were related.

The discussion emphasized that there would be danger of foreigners importing raw material to their own factories established in such zones and re-exporting the finished product in competition with American manufacturers. It was agreed that the scheme mentioned needed much investigation before any decision could be made.

The difficulties of granting foreign credits, the possibility of exporters combining to obtain data for establishing bureaus to furnish foreign credit and the assistance that should come from our government were among the problems discussed under the head of foreign credits and credit information. "We must look," said E. E. Pratt of the Overseas Products Co., "to the government for a consistent foreign policy with reference to the establishment of stable government and the preservation of the existing economic system throughout the world."

Packing for the A. E. F.

The methods used by the A. E. F. to overcome packing problems were related by Captain H. R. Moody of the U. S. Army, who gave several concrete examples, among which was the army system of handling the Packard truck. "It was found that the original 5-ton Packard truck completely set up occupied 1,000 cu. ft., and after experiments we found that the truck could be dismantled without seriously interfering with reassembly overseas. It was packed in a crate to occupy 268 cu. ft., thus allowing four trucks to go where one had been shipped before.

The convention closed following a decision to hold the next annual meeting in San Francisco, and with a vote of thanks to the various officials.

Willys Profit-Sharing Plan on 50-50 Basis

Establishes Community of Interest Between Workers and Employers—
First \$400,000 Has Been Distributed

By J. Edward Schipper

THE plan of the Willys-Overland Company to divide the profits of the company over and above the amount reserved for interest upon capital on a 50-50 basis would have been considered sufficiently revolutionary to be ridiculous 4 or 5 years ago. It has been adopted in the past 2 years by a number of concerns and is not even radical enough to be questioned as a general plan. The main interest of the plan arises from the fact that this is perhaps the largest organization by which it has been adopted and is an organi-

zation directly in the automotive field. For the same reason the details of the plan should be considered very carefully and the advantage or otherwise of each provision should be noted, for the benefit of the other industrial establishments in this field. While this is no longer radical but only good practice, the best of practice being always far ahead of the general method, it is a clear and important mark of progress in the new relations which are being established between employer and employee.—Harry Tipper.

ONE of the most important developments in the newer relationship between capital and labor is the profit-sharing plan now in operation at the plant of the Willys-Overland Co. in Toledo. John N. Willys announced last January that he would introduce for the years of 1919 and 1920 a fifty-fifty profit-sharing plan. Summed up in a few words, this plan is outlined in the following statement: "That after permanent capital and permanent labor have each been justly compensated, having due regard to the cost of each (the cost of capital and the cost of living), the additional profits accruing from the joint employment of permanent capital and permanent labor shall be divided equally between them—fifty-fifty."

The thought underlying the John N. Willys plan, which is published in detail herewith, is to create among the men the feeling that they are working with the company instead of for it. The Willys-Overland Co. is taking its employees into partnership and splitting its profits on a fifty-fifty basis.

How this will work out remains to be seen. The first \$400,000, representing one-half the profits of the first quarter, has just been distributed. Ten thousand Overland workers have received checks for their share in these profits. The indications are that the plan is going to work well, but with many thousand workmen, large numbers of whom are foreigners, it is not possible to reach them all through the printed word. It is therefore necessary to bring the message home to them by spoken word, often in their own language, and the Willys-Overland Co. is holding meetings five times a day, taking 500 men at a time and instructing them in the details of the fifty-fifty plan.

Some amazing results have been found. When the committee of five, appointed from the ranks of the employees, first started to tell the laborers of the plan, they

found that outside agitators, taking advantage of the inability of some of the workmen to understand English, had given distorted ideas as to what the plan meant; and a marked change of attitude and a rapidly growing enthusiasm for the plan developed among these men as soon as it was made clear to them.

An interesting instance may be cited. One of the machine workers—a boy seventeen years of age—approached one of the committeemen and said: "Is it true that we are going to share one-half of what the company makes?" When the committeeman informed him that it was true, the seventeen-year-old workman replied: "Then why don't you turn out your lights during the noon hour?"

Needless to say, his suggestion was quickly acted upon, which resulted in a great saving in current, due to the turning off of thousands of lights throughout the great Overland plant. This is only one instance in many. Hundreds of suggestions and interesting questions are pouring in daily to the office of L. M. Ellis, the chairman of the fifty-fifty committee.

Picking a committee from the ranks of the workmen, so as to be sure that men of high intelligence and knowledge of sociological conditions would be found, presented an interesting problem, and it was solved in an equally interesting manner. The company announced that the committee of workmen to serve on this committee would be selected from those who sent in the best suggestions regarding the working out of the fifty-fifty plan. Sixty-three writers were picked as logical candidates for the committee, and one by one they were called into the office for an interview. An idea of the quality of the men who were called in may be gained from the first five who entered.

The first was a graduate in sociology from an eastern
(Continued on page 944)

The Willys-Overland Profit-Sharing Plan

PROFIT DISTRIBUTION PERIODS

Five distributions of profit to employees shall be made each year. The first four of these shall be based on a conservative book inventory and the fifth on the regular annual inventory:

No. 1. Distribution in April, for January, February and March.

No. 2. Distribution in July, for April, May and June.

No. 3. Distribution in October, for July, August and September.

No. 4. Distribution on Dec. 24, for October and November.

No. 5. Distribution in March of the following year to include December, the difference between book and annual inventories, and other adjustments.

Distributions 1, 2, 3 and 5 shall be made as early in April, July, October and March as the necessary records can be completed.

Separate profit-sharing checks shall be distributed.

PERMANENT LABOR

1. Every employee, after 6 mos. of continuous service, shall become a profit-sharer and be classed as "Permanent Labor." In the first distribution thereafter he shall receive a share of the profits which have accumulated from the date of his employment to the close of the period which is being distributed.

2. However, for the purpose of establishing the distributions of April and July, 1919, on a fair basis, profits earned by the company between January 1, 1919, and March 31, 1919, shall be distributed in April to employees who were on the company's employment records for the pay period ending Dec. 18, 1918, and who gave continuous service in January, February and March, credit being given these employees for 3 months' previous service.

Profits earned between April 1, 1919, and June 30, 1919, shall be distributed in July to employees who were on the company's employment record Feb. 1, 1919, and who gave continuous service in February, March, April, May and June, 1919, credit being given these employees for 1 month's previous service.

CONTINUOUS SERVICE

3. Employee's record of continuous service shall not be affected by absence on account of sickness or injury, or if it is by the consent of employer. Absence from work for two consecutive days or three times in 30 days without report and acceptable excuse shall automatically remove an employee's name from the continuous service record.

4. Record of employees absent in military service shall be considered as continuous, provided they make prompt application for re-employment after their discharge from military service. If the date of their application for re-employment is more than 10 days after date of discharge from military service, their eligibility for the continuous service record shall be determined by the Fifty-Fifty Division.

5. If any employee leaves the service of the company after being qualified for profit-sharing for 6 months' continuous service, his record shall be held open until the next distribution, when a final profit-sharing check shall be mailed to his address.

6. If an employee is discharged, the Fifty-Fifty Division shall determine distribution of profits upon the merits of the case.

Note.—The provisions of paragraph three shall take effect April 1, 1919, and shall not operate against an employee's continuous service record before that date.

BASIS OF DISTRIBUTION

In distributing profits, no salary or wage shall be considered as in excess of \$5,000 per annum.

As stated in paragraph one of Permanent Labor, employees shall receive payment of profits in the first distribution after the completion of their first 6 months of service with the company. During the 6 months, a share of profits shall be credited to each employee's record, beginning with the date of his employment.

Distribution of profits to permanent labor shall be on the following basis:

FIRST FOUR DISTRIBUTIONS

If profits to be distributed in periods Nos. 1, 2, 3 and 4 amount to 6 per cent or more, but less than 8 per cent, on the total of wages paid in the period to employees whose names are on the last payroll of the period, 6 per cent of the wages paid shall be credited to each employee's record, except that no employee's share shall be less than 4 per cent per hour for each hour worked in the period. If the amount is in excess of 6 per cent, this excess shall be transferred to Distribution No. 5.

If profits to be distributed are 8 per cent or more, but less than 10 per cent, 8 per cent shall be credited, as indicated in preceding paragraph, no employee's share to be less than 4½ cents per hour for each hour worked in the period. The excess, if any, above 8 per cent, shall be transferred to Distribution No. 5.

If profits to be distributed are 10 per cent or more on total wages paid in the period, 10 per cent shall be credited, as indicated in previous paragraph, no employee's share to be less than 5 cents per hour for each hour worked in the period. The excess, if any, above 10 per cent shall be transferred to Distribution No. 5.

If profits in any one period do not equal 6 per cent on the total of wages paid in the period, no payment shall be made for this period (except under Paragraph five of permanent labor), but this amount of profit shall be transferred and added to the profit of the following period.

DISTRIBUTION NO. 5

This shall be based upon profits to be distributed for December, adjustment of book and annual inventories and accumulation of excesses from previous periods. It shall be credited on the basis of the percentage of its total amount to the total amount of wages paid in the year to employees who work in December.

Length of service with the company shall be rewarded by giving an employee an addition of 1 per cent per month to his share of No. 5 distribution for each month of continuous service in excess of 12 months after Jan. 1, 1919, until a maximum shall thereafter be added to such employee's share of each No. 5 Distribution.

PERMANENT CAPITAL

Permanent Capital is the net book value of the assets of the company, not including Good Will, Patents, Trade Marks, etc.

Statement of Dec. 31, 1918, shows the Permanent Capital of The Willys-Overland Co. to be the sum of \$79,668,232.92.

COMPENSATION

In arriving at the "Just Compensation" to Permanent Capital, as related to our 50-50 profit-sharing distribution, there must be established—

1. An average rate for depreciation, based on general standard accounting practice, subject to approval of certified public accountants;

2. A reserve for contingencies or "Rainy-Day Fund," at an estimated rate;

3. A just return to invested capital, or cost of securing the necessary capital for investment in the industry.

university and had been a professor of sociology in the University of Illinois, but is now working in the Overland shop. The second is a graduate chemist. The third is a man holding a civil engineer's degree. The fourth was formerly an Irish editor on a German paper, a man whose keen wit and knowledge of human nature made him at once an acceptable candidate for the committee. The fifth has been president of the Toledo Socialist Club and is a keen student of sociological conditions.

With men of this mental caliber coming from the ranks of the workmen, it is evident that the fifty-fifty plan was submitted to the keenest type of minds before it was presented to the workmen. These men having both wide experience and at the same time being fully aware of shop conditions and the psychology of the shop employee, are the best possible judges that could be found, and their endorsement of the plan is a strong prophecy for its success.

John Willys in this plan has taken a long step away from what has been all too common in the past—the treatment of labor as a commodity and not as a group of human beings. This is the basic principle upon which this scheme has been laid out. It is common knowledge that the smaller the shop the less frequent are labor troubles, and the reason is not far to seek. Here capital is in such contact with labor that the capitalist or his representative, the president of the company or other officers, know the men in the shop by their first names. There is a point of human contact which is impossible in the vast industrial institutions which have grown up in the automobile business. Just as soon as this personal contact is established and labor becomes human to the employer, labor troubles become less if the employer is a man of proper disposition and character.

Establishing Point of Contact

Such close intimacy is impossible in a great organization such as the Willys-Overland. In its place there must be some other point of contact. This Mr. Willys is attempting to establish through a community of interest. He is making it as much of interest to the laborer in his plant to have the Willys-Overland Co. show a large profit as it is to the capital element in the concern. When workmen begin to feel that when they waste material or tools they are not only cutting down the profits of the concern but they are taking money out of their own and fellow employees' pockets, they become more careful. This has already been illustrated by the example of the seventeen-year-old worker and the lights. It was shown again in the Overland forge shop, where, when the workmen were informed that for every Overland car \$7 is represented in the scrap pile, they were astounded and are already hunting means of reducing this scrap percentage.

Analyzing the plan which is printed herewith in detail, it will be seen that there are five distributions of profit, distribution No. 1 taking in the first quarter, No. 2 the second quarter, No. 3 the third quarter and No. 4 the months of October and November. The distribution for the month of December is made in the following March, and at the same time adjustment is made between the estimated and the actual inventories, and other adjustments. This adjustment No. 5 is popularly termed among the workmen "The Jack Pot." This "Jack Pot" is exciting a great amount of interest and discussion among the employees.

During the first three periods of the year and the last two months of the fourth period, the distribution is made on a straight percentage or time basis, as will be seen under the head "First Four Divisions." All excesses of profits over the percentage distribution go into distri-

bution No. 5. Besides this, 1 per cent is added for each month of continuous service in excess of 12 months after Jan. 1, 1919, until a maximum of 50 per cent is reached. This gives a growing and attractive offer under the No. 5 distribution and not only does it reward the steady employee up to 50 per cent of his pay, but it offers an interesting chance of making a considerable bonus, should the profits of the company be exceptionally heavy.

Some typical questions which are being asked by the workmen, and which are published in *The Willys News*, a paper circulated among employees, are given below. These bring out clearly the thoughts which are in the minds of the men in discussing the fifty-fifty plan. The questions and answers follow:

Question No. 1.—*"Is the six months' continuous service feature fair to the employee who works four or five months during the busy season, and is then laid off when the dull season comes on?"*

Answer.—"The committee has asked Clarence A. Earl, first vice-president, to state what effect the future policy of the company will have on this condition. Mr. Earl makes the following statement:

"Our production will soon be limited to two models of a character which will be in demand practically the entire year. We also anticipate so great demand for these that our present capacity and the number of employees must be largely increased. We recognize the great advantage, both to our employees and the company, of continuous production the year around and that was one of our principal reasons for reducing our line to these two models of popular character.

"Therefore, there should be no reason why every employee should not have a continuous record of more than 6 months. If there is temporary slackness in a department the foreman can keep the employee on the continuous record until there is work again. Even if an employee should leave a department, for good reason, he will be given first consideration on openings in other departments and his continuous record will not be broken because he changes his clock number.

"Granting that conditions which have existed heretofore may have justified this employee's question, it is certainly the policy of the company to do everything possible to change these conditions."

Question No. 2.—*"I do not understand the last paragraph of the section on 'Basis of Distribution.' Can you give an example of its application?"*

Answer.—"That section reads: 'Length of service with the company shall be rewarded by giving the employee an addition of 1 per cent per month to his share of No. 5 distribution for each month of continuous service in excess of 12 months after Jan. 1, 1919, until a maximum of 50 per cent is reached. This maximum shall thereafter be added to such employee's share of each No. 5 distribution.'

"We believe the following example will show what is meant: If an employee has a continuous service record of 24 months on Dec. 31, 1920, his total wages of say \$1,200 for 1920, will be multiplied by 112 per cent and this increased amount, \$1,344, would be used as the basis for computing his share of No. 5 distribution, payable in March, 1921. The 150 per cent maximum, on the above basis, would be reached in 1924."

Question No. 3.—*"I do not understand the 8 per cent (four and a half cent minimum) distribution. I have worked 500 hrs. in January, February and March, and my total wages for those months is \$300. What will be the amount of my fifty-fifty check?"*

Answer.—"Eight per cent on the amount of your wages is \$24; four and one-half cents per hour on your total hours worked is \$22.50. You will therefore receive the larger amount, \$24."

Question No. 4.—*"Will the profit-sharing checks be considered as a part of the employee's wages?"*

Answer.—"Absolutely no. Mr. Willys, in his announcement, plainly stated, 'These plans will have no influence on periodical adjustment of wages.'"

Organization Plans Should Appear in Time of Industrial Peace

Their Justification Is Increased Production Per Man—Variability of Human Element Is Important Consideration

By Harry Tipper

THE problems which have come up before the manufacturer, in connection with the task of keeping his labor harnessed and producing under conditions that have come to be normal, have caused us to act upon these problems because of the necessity of arriving at some solution in each individual case. It has not been possible to study the situation with sufficient care in many cases to permit of arriving at a solution which would form a basis for future harmony.

When a strike is declared by the men in the shop, or when a grievance has been submitted by the union, either locally or nationally, that particular strike must be settled or that particular grievance must be solved, even though the solution of the grievance, or the settlement of the strike, do not offer any hope of removing the cause of the discontent or laying the basis for adjustment of future disputes before they reach the point of final action. The length to which this necessity of meeting the immediate problem may carry the manufacturer is illustrated by the story of conditions in Great Britain during a portion of the war when the factories were under the control of the Ministry of Munitions.

Compromises Handicap General Solution

It was decided to give piece workers a bonus to cover the increased cost of living. This was done after a series of conferences with the labor organizations and the manufacturers. At the same time it was decided to give a flat percentage increase to the day workers in the shops, so that they would have the benefit of the increased pay in the same way as the piece workers. About every so often a new body of workers brought to the attention of the Government the fact that they had not been included in this increase, until the sweepers and the night watchmen had brought their case to the Government with sufficient force to require their inclusion.

Not long after the skilled workers came back with this original proposition as a demand for further increase. They said: "A year ago we were making 30 per cent more than the helpers, and now we are only making 18 per cent. We need a further increase in the bonus to re-establish former relations," and the whole question of wage increase was reopened, of course. This necessity for meeting the

individual and the general problem at all times has forced compromises which have worked against the study and attention which must be given in order to secure a logical basis for the general solution.

It has been stated in these articles, in the earlier part of their development, that no organization changes which attempt to provide machinery for the discussion and agreement upon these points can be made at a time when an immediate necessity has arisen and be of any service in warding off that necessity. If workers are about to present their grievance in respect to wages, or hours, or anything of that kind, and the manufacturer brings out a plan for profit sharing, for joint committees and conferences, etc., at that particular time, the plan which he is bringing out will suffer because of the problem which lies immediately ahead and the attitude of the worker's mind at that moment.

No Suspicion of Motive Wanted

Organization plans which are built up in the hope that they will establish a permanent machinery for the purpose of discussion and examination of these matters must be promulgated at a time when there is no immediate fight on hand and when there can be no additional suspicion of the manufacturer's motive.

In the severity of the warfare which has characterized the industrial development of the last three or four years and the hasty decisions upon problems which have been made we have lost sight of the fact that, no matter what form the organization may take, it must, in the end, justify itself by securing a better production per unit per man, and that it should be based, therefore, upon a study of the factors which govern production and the relative importance of those factors.

The public, as buyers, are interested in the effect on costs to them, and have no particular interest in the division of those costs. This has been illustrated amply since the armistice was signed by the general attitude of all manufacturers or producers, each of whom can tell you many reasons why the price of his own product cannot be reduced, and also inform you of the products which he buys at a cost that he considers entirely unjustified by circumstances and explainable only by profiteering.

The farmer knows the cost of producing his

wheat and other crops, and he can inform you in great detail of the necessity for the price which he is securing. He believes, however, that the price of many of the implements which he buys and the equipment which he must use is unjustifiably high and should be reduced.

The director general of railroads is contemplating a freight increase necessitated by the financial statement of the year's operation. It is considered probable that these rate increases will be necessary to meet the costs of running the railroads. At the same time, the director general refuses to accede to a definite price on steel, expecting that it will and should be reduced further in order to become what is termed normal.

Increased Production Justification of Plans

The object of all organization work which attempts to provide a more logical and harmonious grouping in the industrial plant is to eliminate those indefinite but very real costs due to strikes, personal grievances, absences from work, and to eliminate the equally obvious costs which arise from the lack of incentive and, therefore, the lack of any attempt to use the worker's full capacity. When they are fully developed, these organization plans, therefore, must justify themselves by increasing the unit production per man, enabling his wages to be increased without increasing the final costs, and without eliminating the necessary profit on the capital.

It should be recognized in dealing with human conditions that time is an important factor in their development toward harmony and efficiency, and no immediate effect can be expected which will justify the hope with which the organization changes have been established. The more indefinite factors which affect the total production per man have been neglected for so long, not because of their unimportance, but because of their intangibility, that it will require special work to bring out, as the by-product of organization changes, the increased efficiency per man, which is the ultimate necessity of the case.

Production Depends on Individual

The actual production per man varies between different individuals, and on different days with the same individual. It varies between different shops and different departments in the same shop. It varies with the character of the work, with the character of the surroundings and with the immediate conditions in those surroundings. Up to the present, the average which has been produced has been the only basis upon which the future production can be measured, and this basis has been accepted, although it is obviously a very unscientific basis upon which to predicate production efficiency.

The necessity for the careful and conscientious study of the habit of mind, the aspirations, even the subconscious necessities, of the workers, as well as their living conditions, surroundings at work and the necessities of labor conditions rise out of the fact that it is largely by the examination of these

intangible factors that production efficiency can be increased in the future.

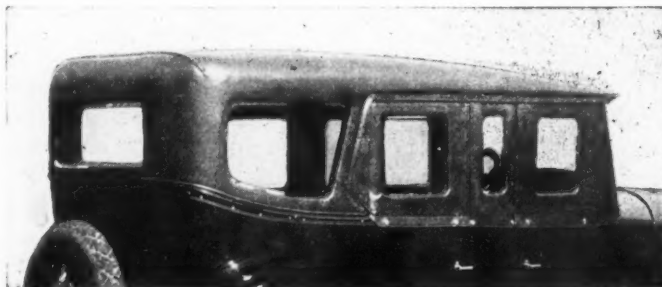
Up to this time the increase of production has come not so much out of the study of the man as it has come out of the development of the machine. When work had to be speeded up and provided at a low cost per unit, new machines have been built which have undertaken the operations in larger quantity in less time and with less handling required. But this development, by the improvement of machines, has arrived at the stage where it is able to affect the production cost only by minute percentages and in connection with minute subdivisions of the total operation. The improvement will constantly grow as human ingenuity is put to the problem of meeting increased cost of production by the development of more rapid and effective machinery.

This development of machinery, however, will not relieve the warfare that exists, the difficulty of maintaining an efficient organization of men, the large turnover among the average workers nor any other of the human problems which lie in front of us. Neither will it take the place of the improvement in production which can be secured by the study of the human element in industry.

During the war it was demonstrated that 50 per cent, 75 per cent and 100 per cent increase in the production from certain machinery could be secured without difficulty when the workers were sufficiently interested in the matter to speed up their own operations, and expend the necessary energy. Such percentages of improvement as this, arising from the satisfaction of just one human desire entering into the work, indicate the field for investigation which lies before the manufacturer and which offers great rewards in production improvement as it is properly investigated and translated into organization operations.

A New Closed Top

At some of the recent Midwestern automobile shows, a new closed top, known as the Class Top, was exhibited by the Consolidated Top Co. of Cleveland, Ohio. At the Detroit show it was shown on a King Foursome car. The half-tone cut herewith shows the appearance of this top. The advantages claimed for it are that it is light and non-rattling, and gives plenty of light for the interior of the car. The windows are all of plate glass. The side curtains are removable, and the valance, that is, the strip against which the doors and curtains abut, can be taken off, leaving the machine of neat appearance when driven without the curtains. Ordinary storm curtains may be used with this top as a protection against rain during the warm season.



Class top shown by Consolidated Top Co.



*Michelin steel
disk wheels*

Disk Wheels for Passenger Cars

Four Years of War Experience Have Shown
the Value of Steel Disk Wheels—Michelin
and Fiat Leading European Manufac-
turers—Michelin Wheel to Be
Introduced Here

By W. F. Bradley

STEEL disk wheels are a coming feature of French passenger carrying automobiles. Four years' war experience has shown the value of the disk wheel. During the war the two biggest producers of steel disk wheels have been Fiat in Italy and Michelin in France. The former firm equipped all its 1½-ton pneumatic-tired trucks and the great proportion of its touring cars with steel disk wheels. Michelin produced steel disk wheels for a large number of French makes of 1½-ton trucks and for many makes of staff cars. Now that the war is over Michelin is profiting by experience gained and is preparing to produce his disk wheel for touring-car purposes. The programs already laid out indicate that an important number of French manufacturers will adopt the Michelin steel disk wheel as standard equipment.

Although similar in general appearance, the Fiat and the Michelin disk wheels are different in construction. Fiat builds up the wheel with three disks, two of them being small and of equal diameter, and riveted to the thin, full diameter disk, which in turn is riveted and spot-welded to the rim.

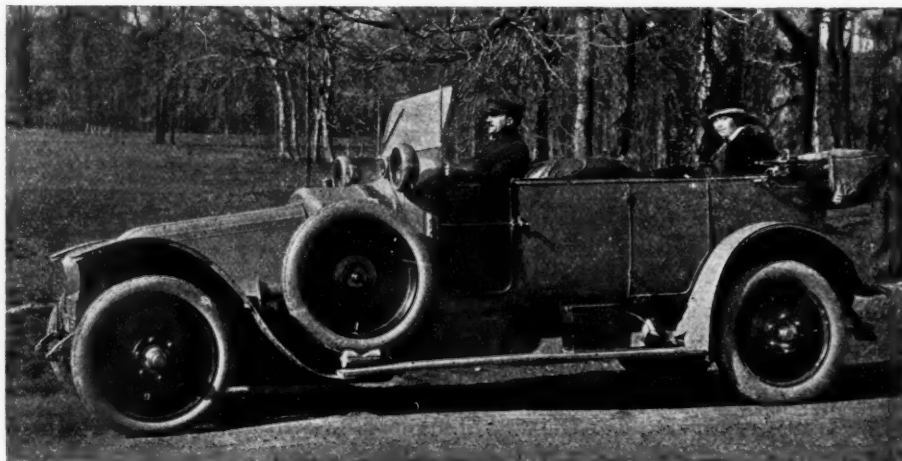
The Michelin wheel is composed of a single disk, which

is stamped out hot under the press and then turned down in the lathe, so that the cross-section becomes thinner as it nears the outer circumference. A wheel which has a thickness of 5 mm. (0.2 in.) at the center tapers to 2½ mm. (0.1 in.) at the outer edge. This outer edge is turned over so as to be at right angles to the main wall of the disk, and is then riveted and welded to the rim. This construction enables the total weight of the wheel to be reduced considerably without any weakness, and has the advantage of removing weight at the most desirable point, namely, near the outer circumference. Attachment is by means of 4, 6 or 8 studs, according to the size of the wheel. These studs, which are fixed in the permanent hub, are of the same diameter throughout their length. The corresponding holes drilled in the wheel, however, have beveled edges, and the nuts by which the wheel is held in position have beveled bases. These two beveled surfaces not only serve to center the wheel in the studs, but have a self-locking effect and make unnecessary the use of spring washers under the nuts. A right-hand thread is used for the right-hand wheels and a left-hand thread for the opposite side.

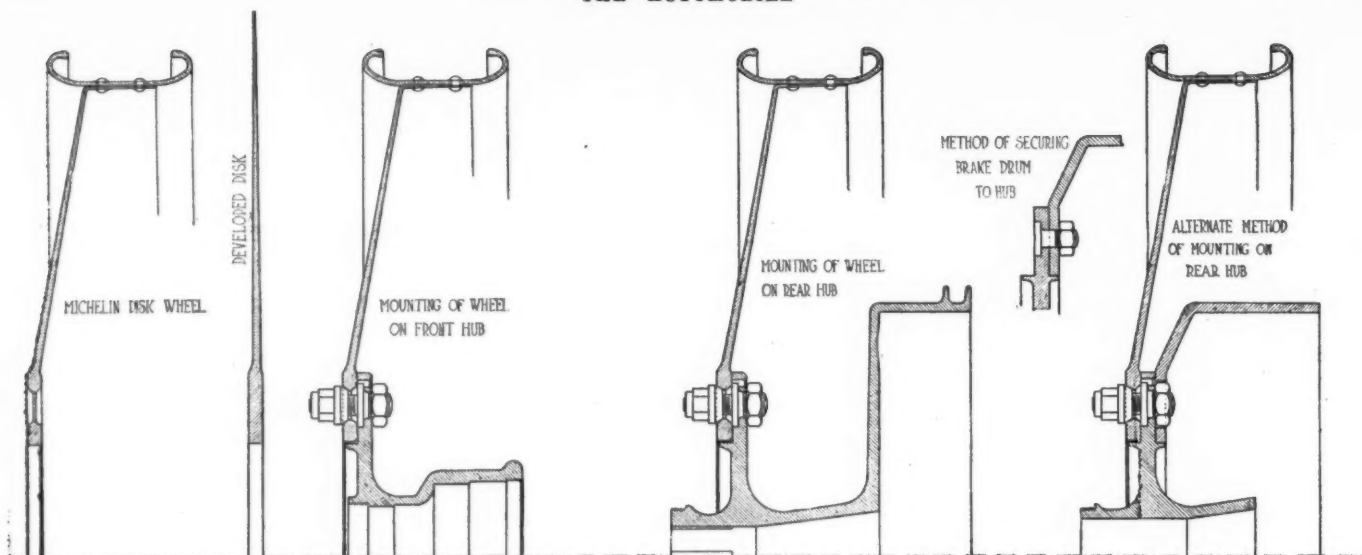
Advantage claimed for this wheel is greater strength than is possible with any wood wheel. The weight is the same as for a wood wheel. There is free radiation of heat through the disk, which tends toward cool running of the tires. Careful experiments have been made in this connection by the Michelin company, which states that the



Fitting Michelin steel disk wheel



Renault car equipped with Michelin steel disk wheels



Sectional views of Michelin steel disk wheel types

tires run perceptibly cooler and that the degrees of heat at various points on the circumference of the disk can be accurately measured. The disks become cooler as the center is reached. The locking arrangement is simple and cannot possibly get out of order.

The usual tool is a brace, but if this is lost any ordinary wrench can be used. The disks are ideal from the standpoint of cleanliness, and add to the streamline appearance of the car.

The European tendency is toward detachable wheels as distinct from detachable rims. Clincher beads are used to the total exclusion of straight-side tires. The argument of European manufacturers is that with the fixed rim and detachable wheel, equipped with clincher tires, a very much lighter wheel is obtained than with the American system of detachable and demountable rims. The European public has never had any experience of straight-side tires, and thus is not in a position to judge of the value of a detachable rim. The argument is also advanced that under the European system of detachable wheels a complete wheel is always available in case of a wheel breakage, whereas under the American system if a wheel breaks the car is held up until another wheel can be procured.

With the Michelin type wheel duals can be fitted very readily and all the wheels are interchangeable. The French are convinced that the dual idea is preferable to big singles. The only precaution is that the two duals shall be fitted as close together as possible. If the clearance is only just sufficient to prevent the walls of the tires chafing, no trouble will be experienced by stones lodging between the two and cutting the walls of the tires. This has been fully borne out by war experience.

The Michelin company will introduce the detachable steel disk wheel to the American market with straight-side beads in place of clinchers. Having proved successful and popular in Europe, and having stood up to all the tests imposed by war conditions, it is believed that this type of wheel will find ready adoption in America. It is a most interesting proposition from a manufacturing standpoint, for while there are many details which must be given careful attention, as has been shown by four years' war experience, the cost of production is low. All Michelin wheels are interchangeable. This simplifies the position of the dealer, who has only to keep in stock wheels of given sizes, without any thought as to the car on which they have to be fitted.

In order to facilitate fitting, Michelin supplies two

standardized tools—a brace for tightening the nuts and a tubular lever for lifting the wheel on to the studs. This lever is passed through one of the holes drilled in the hub of the wheel and slipped over one of the studs. In this way the wheel is both guided and levered into position.

Use of War Trucks in Industry and on the Farm

THE contention is made in an article in *Der Motorwagen* of Feb. 20 that many army trucks received such rough treatment that they will be of little use in commercial work. Such abuse causes fatigue of the material employed. This question of fatigue is, of course, taken into account when a vehicle is being designed, but, of course, the stresses ordinarily provided for will, in many cases, have been considerably exceeded owing to the mishandling the vehicles will have gone through.

The overloading, which will generally become apparent by marked, permanent deformations of the various parts of the vehicle, will have as concomitant a depreciation of the properties of the material, especially its strength, by unsuitable treatment in field repairs, *e. g.*, wrong heat treatment and the like, which will leave no external traces behind.

If a "demobilized" truck, then, is to be made even partially reliable as a vehicle for peace purposes, it will not suffice to simply repair it in the ordinary way and re-varnish it, afterward passing it over to the customer. Every firm of repute will certainly see that all the most important components, even those exhibiting no external damage, are tested for strength. This is easier said than done; for a strength test with the Brinell machine can only indicate local strength at the particular place where the test is taken. Again, difficulties arise in heat-treating the parts owing to risk of spoiling machined parts and to shrinkage after heating.

There is, of course, the possibility of making a systematic endurance test of the valuable parts under working conditions on the test ground, but this method, besides being expensive and taking time, gives no reliable data for the value of the part tested.

After all these considerations, the writer comes to the conclusion that in view of the fact that the German reputation for quality has still to be maintained, demobilized trucks, etc., should be hired out by the government to help in the next harvest and get over the shortage of draft animals, and then sent back to the factories that built them, and scrapped.

Thus the heavy vehicle industry would be able to get a certain amount of raw material at a time when materials are extremely short. In this way firms would be able to supply practically new vehicles (or at least very good "rebuilt") to business people in a small way and to farmers.

Sparking Power of Magnetos

Oscillograms Showing Electromotive Force Across Contact Points of Breaker and Current Flowing in Ignition Circuit for Five Different Points of Interruption

By Harry F. Geist, E. E.

IN an article on "Generation and Storage of Energy in Magnetos," published in AUTOMOTIVE INDUSTRIES, Vol. XL, page 411, the writer derived some rules regarding the range of energy storage in magnetos designed for ignition purposes, and illustrated a graphic method (Fig. 7) for determining the stored energy range.

It is the purpose of this article to present an analysis of the energy delivery in the ignition spark by a magneto, for different armature positions over its energy range, showing the amount of the energy delivered, its ignition power, the duration of energy flow and various other characteristics, including coincident losses.

This analysis will be based upon oscillographic records taken directly from the ignition spark, and inasmuch as the same magneto was used as in the above mentioned article, this analysis may be regarded as a continuation of that article.

There is a very marked difference between the amount of energy stored in a magneto (and apparently available for a spark) at any particular armature position and the amount of energy of the spark produced when the circuit is suddenly interrupted while the armature is in that position. This difference is due to the fact that the spark, which represents the energy dissipation during the change from short circuit to open circuit, has a duration of only a few thousandths of a second, and being the result of a very quick magnetic readjustment, the attending iron losses are very heavy.

It will furthermore be shown that for armature positions in the early part of the sparking range, when the machine is generating energy for storage at a high rate, an interruption of the circuit for a spark will not only result in an expenditure of the stored energy, but the spark will also receive energy that is generated directly due to the motion of the armature during the sparking period. This latter point is a very important consideration where springs are used in driving the magneto.

In order to illustrate the study of the ignition spark and to show the true sparking range of the magneto, the oscillograms, Figs. 1, 2, 3, 4 and 5, are presented as records of sparks taken at five different armature positions within the energy range of the magneto. These positions are 10, 40, 70, 100 and 120 deg. respectively beyond the vertical position, at a speed of 600 to 625 r.p.m.

As the duration of the spark is only a few thousandths of a second, in making these oscillographic tests, the photographic drum was revolved at a high speed, so that the phenomena occurring during sparking would be drawn out sufficiently along the time ordinate, and measurements could be made from the record with a fair degree of accuracy. The speed of the drum was from 1000 to 1200 r.p.m. The armature of the magneto was rotating at only about half the speed of the film drum, and in order to insure that the phenomena of sparking would be recorded on the film free from other disturbances, it was necessary to "time" the make and break igniter with

the oscillograph just as "timing" would be done on an engine, and it was also necessary to have a switch key in series with the oscillograph shutter circuit for manual control, so that only one spark would be recorded during the operation of the set-up. With this synchronized test arrangement, a simple change in the relation of the armature to the igniter gave the results for the different armature positions desired, for each successive test.

The oscillograph used was a three galvanometer type instrument, so that it was possible to take a record of three electrical forces simultaneously.

In each of the five oscillograms presented, the upper curve shows the voltage across the contact points of the igniter and represents therefore the electromotive-force curve of the spark. During the period of closed contacts, the voltage was, of course, nil, so that the instant when the igniter contacts separate is indicated on the oscillograms by the rise of the voltage curve from the zero line. This point is denoted on the oscillograms by the vertical line marked "Break."

The general nature of the induced voltage curve is the same in all five records. It is shown how the voltage of the spark increases very rapidly toward its maximum as the energy is dissipated in the spark, and then drops off to the open circuit voltage value for the particular position the armature happens to be in, until the con-

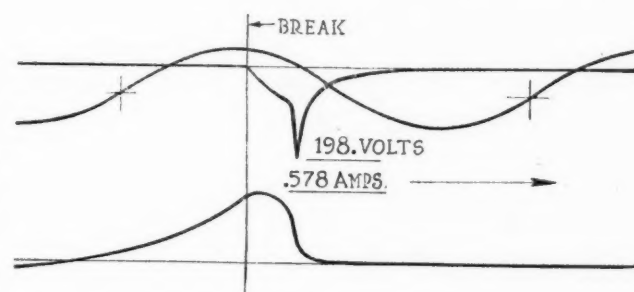


Fig. 1—Armature about 10 deg. beyond the vertical position

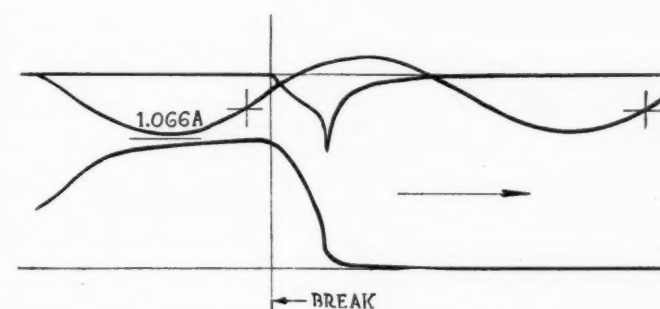


Fig. 2—Armature about 40 deg. beyond the vertical position

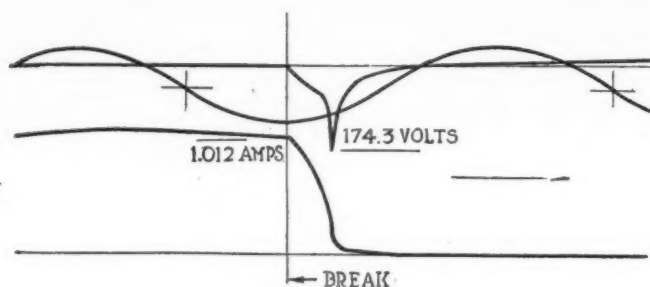


Fig. 3—Armature about 70 deg. beyond the vertical position

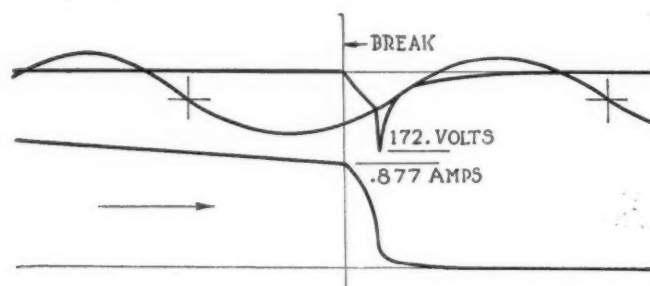


Fig. 4—Armature about 100 deg. beyond the vertical position

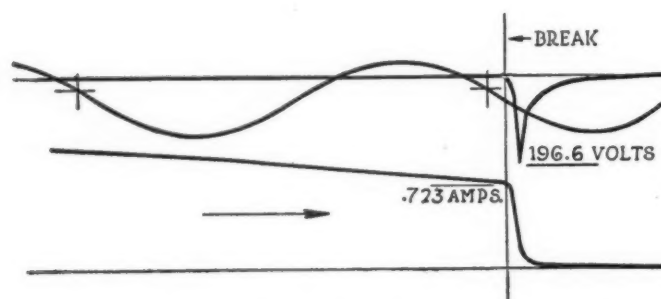


Fig. 5—Armature about 120 deg. beyond the vertical position

tacts close again. It is this induced e.m.f. maximum that tends to break down ignition insulations. Special attention is here called to the fact that this e.m.f. does not attain its peak value until practically all of the energy has been spent in the spark.

The lower curve in each case shows the current generated during the closed circuit periods, up to the instant of contact point separation, as indicated by "Break," and the manner in which the current continues to flow through the circuit formed by the spark, dropping off as the stored energy of the circuit expends itself in the spark. The period required for the current to drop to zero is therefore a direct measure of the duration of the spark.

The third curve, which is practically a sine wave, represents an ordinary 60-cycle lighting circuit wave, and is therefore a direct time calibration of the oscillograms in that the distance between crosses in each case represents 0.01666 second. The arrow shows the sequence of events.

Fig. 1 of the article referred to in the opening paragraph of this article shows an uninterrupted short circuit current wave of this same magneto, for one complete revolution of the armature and at practically the same speed at which these five sparks were taken, so that the generated currents in these five oscillograms represent the same current wave. This fact served as a check on the determination of the armature positions at which the sparks were received.

A study of Fig. 1 of this article shows that, following the interruption of the circuit, the current rises slightly to a maximum value of 0.578 ampere from 0.508 ampere at the instant of break. This current increase during sparking is due to the fact that at the 10 deg. armature position the magneto is generating energy at a very high rate, as is manifest from the rate at which the current increases just before interruption, and the additional circuit resistance at the beginning of the spark is not sufficient to check the current generation immediately. This means that energy is generated and delivered directly to the spark.

The sparks of the oscillograms, Figs. 2, 3, 4 and 5, have the characteristics of low tension sparks and show the current drop following break immediately.

Theory of the Spark

Before entering upon a quantitative analysis of the data presented in these oscillograms, it may be advisable first to develop some of the theory of electrical sparks of this nature into usable laws in the form of mathematical equations to which this data will be applicable.

When the energized circuit is suddenly interrupted to produce a low tension spark, the separation of the contact points drawing out the spark is equivalent to suddenly inserting additional resistance into the circuit. It is evident that this spark resistance r_s is a variable. It is, therefore, evident that during sparking the resistance of the complete circuit will be the sum of the coil resistance R and the spark resistance or $(R + r_s)$.

It is a well-known fact that the rate at which electrical energy is expended in a circuit having resistance is equal at any instant to the product of the instantaneous current flow squared and the simultaneous resistance value. The power or rate of energy expenditure in this case, neglecting iron losses for the present, is

$$p = i^2 R + i^2 r_s, \quad (1)$$

where i denotes the current at any instant.

In equation (1), $i^2 R$ represents the rate at which energy is lost in the coil at any instant, while $i^2 r_s$ represents the power of the spark for the same instant. If the current is expressed in amperes and the resistance is expressed in ohms, then the rate of loss and the power will be in watts.

Inasmuch as we are interested at this time more particularly in the power of the spark, it will be better to separate it from equation (1) by the following equation

$$p_s = i^2 r_s \quad (2)$$

Owing to the fact that r_s cannot be ascertained by direct measurement, this equation for the spark power is not usable in its present form, but we know that the induced voltage across the contact points must be equal to the voltage drop across the contact points at any instant; that is, equal to the product of the current flow and the resistance, or

$$e_s = i r_s, \quad (3)$$

so that equation (2) can be rewritten in the form

$$p_s = e_s i \quad (4)$$

In this equation e_s and i are the varying voltage and current, respectively, for the spark as recorded in the oscillograms, Figs. 1, 2, 3, 4 and 5, so that it is evident that from the data contained in the records it is possible to calculate the power of the spark for any part of its duration.

When it is considered that the total duration of the spark is only a few thousandths of a second, the remarkable nature of these oscillograms must be apparent.

We also know that in an electrical circuit in which energy is expended at a rate P , for a period of time T , the amount of energy expended will be

$$W = PT = EIT. \quad (5)$$

If P is expressed in watts and T in seconds, W will be expressed in joules.

Under the conditions here considered, the current and the voltage vary, so that the power varies during the life of the spark. The energy equation of the spark is therefore

$$W_s = \int_0^t p_s \delta t = \int_0^t e_s i \delta t \quad (6)$$

in which the limits 0 and t express the duration of the spark in seconds of time, 0 being the instant of "break."

From equation (6) it is seen that, if the manner in which p_s varies with t can be determined for the whole duration of the spark, the total amount of energy represented in the spark is readily obtainable by integration in electrical units which can be converted into heat units by simple multiplication.

By applying the data represented in the five oscillograms to equations (4) and (6), the power and the total amounts of energy of each of the sparks can be determined, as well as other sparking characteristics that will be shown in the calculations.

Quantitative Analysis of Oscillograms

To illustrate the study of the oscillograms, and the use of the equations presented, the spark represented in Fig. 2 may be analyzed as follows:

A series of vertical lines 1/32 to 3/64 in. apart are first drawn from the base line up covering the entire period of sparking; that is, this series of lines covers the period required for the current to drop to zero. The period of sparking is thereby divided into a number of small increments of time δt .

By measuring the time represented by the distance from the line of "Break" to each of the series of lines in succession, and measuring also the current and voltage at each of the instants represented by these parallel lines, then multiplying these simultaneous current and voltage values as per equation (4), and plotting the products obtained against the time after the break, we obtain the power-time relation of the spark directly.

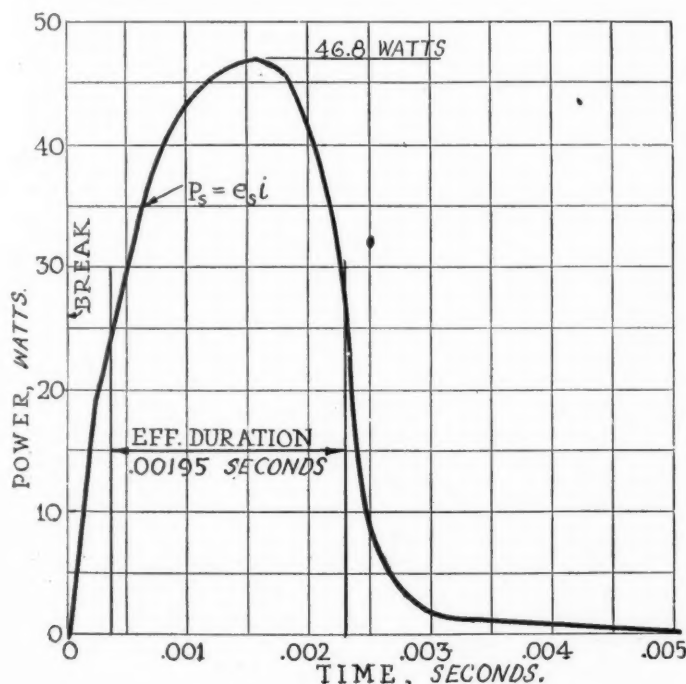


Fig. 6—Spark power curve, showing effective and total duration

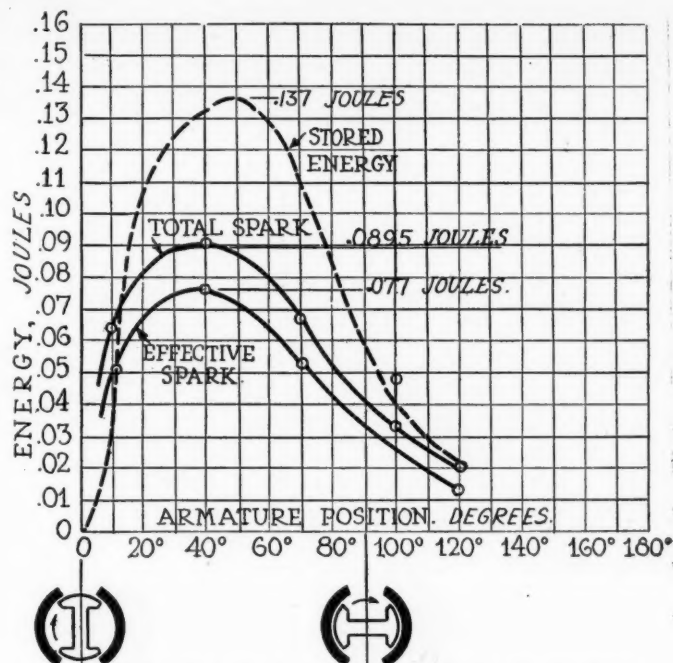


Fig. 7—Showing the true sparking range at constant speed

Such measurements and calculations based on Fig. 2 are given in the following tabulation:

| t Seconds | i Amperes | e_s Volts | p_s Watts | r_s Ohms |
|----------------|----------------|----------------|----------------|---------------|
| 0.0000 | 1.066 | 00.00 | 00.00 | 00.00 |
| 0.000191 | 1.047 | 14.95 | 15.65 | 14.28 |
| 0.000381 | 1.018 | 24.90 | 25.35 | 24.42 |
| 0.000571 | 0.970 | 34.85 | 33.80 | 35.90 |
| 0.000762 | 0.931 | 42.30 | 39.40 | 45.50 |
| 0.000952 | 0.864 | 49.80 | 43.10 | 57.70 |
| 0.001143 | 0.806 | 54.80 | 44.20 | 68.10 |
| 0.001333 | 0.739 | 62.20 | 46.00 | 84.20 |
| 0.001524 | 0.672 | 69.70 | 46.80 | 103.50 |
| 0.001714 | 0.604 | 74.70 | 45.20 | 123.50 |
| 0.001905 | 0.509 | 84.60 | 43.10 | 166.00 |
| 0.002095 | 0.423 | 94.60 | 40.00 | 223.00 |
| 0.002285 | 0.192 | 122.00 | 23.41 | 635.00 |
| 0.002476 | 0.096 | 127.00 | 12.20 | |
| 0.002666 | 0.058 | 92.10 | 5.30 | |
| 0.002857 | 0.038 | 69.70 | 2.68 | |
| 0.003100 | 0.029 | 54.80 | 1.58 | |
| 0.003430 | 0.024 | 34.85 | 0.85 | |
| 0.003810 | 0.019 | 24.90 | 0.48 | |
| 0.004190 | 0.014 | 19.90 | 0.29 | |
| 0.004570 | 0.010 | 14.94 | 0.14 | |
| 0.005330 | 0.000 | 9.96 | 0.00 | |

Besides the calculated spark power, this tabulation shows calculated values of the spark resistance, which are obtained by dividing e_s by i . These present an idea of how the spark resistance increases during the life of the spark.

The relation between p_s and t shown in the above tabulation is plotted to scale in Fig. 6.

A study of this spark power curve reveals the manner in which the spark power increases from zero at the instant of "break" to its maximum value of 46.80 watts and then drops off again to zero as the energy is dissipated.

From this maximum value of 46.80 watts, it is evident that the power of an ignition spark from this magneto is momentarily equal to the power of a good-size incandescent lamp. This power being concentrated in a small arc, the intensity of the heat must be very great.

The total duration of this spark is about 0.00533 second, though it is apparent from Fig. 6 that most of the energy is spent in less than half that time.

It has been the observation of the writer that, to be effective, under the usual conditions of service the power of the spark must exceed 25 watts.

In Fig. 6, the period during which the power of the spark exceeded 25 watts is included between the two parallel lines, and measures about 0.00195 sec.

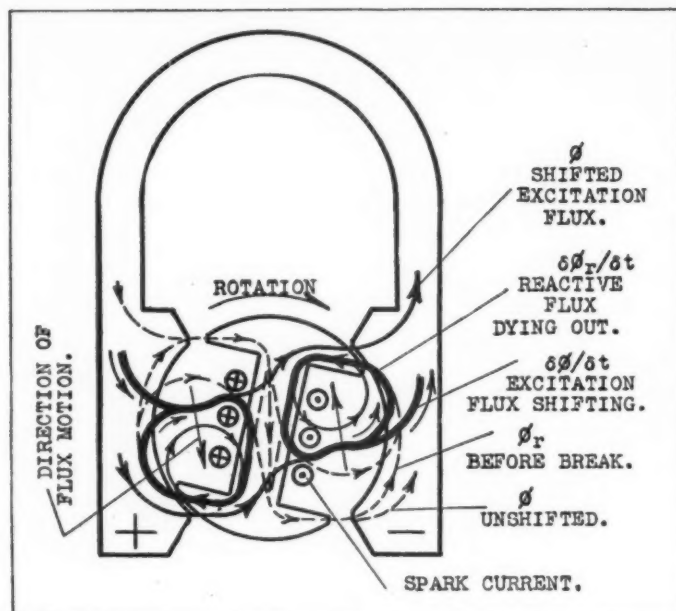


Fig. 8—Induced voltage producing spark current is caused by the flux shifts $\delta(\phi + \phi_r)/\delta t$

In order to determine the energy represented in the spark as per equation (6), it is only necessary to ascertain the area enclosed by the power-time curve and the zero power line and to multiply that area by the joules (watt-seconds) per unit of area as determined by the coordinates of the power curve.

Such an integration may be made by adding up a series of products obtained by multiplying the spark power by the increments of time, but the simpler method is to measure the area enclosed by the curve by means of a planimeter and to multiply the area obtained by the energy per unit of area.

Fig. 6 was measured by means of a planimeter, and the total energy of the spark was found to be

$$W_s = 0.0895 \text{ joule.}$$

In like manner, by measuring that portion of the spark between the effective time limits, the effective energy of the spark was found to be

$$W_s (\text{eff.}) = 0.077 \text{ joule.}$$

From these two values it is seen that 86 per cent of the total spark energy was delivered at a rate exceeding 25 watts.

In a like manner, all the sparks represented in the other oscillograms were analyzed, and showed the following tabulated results as to maximum power, total energy, effective energy, percentage of effective to total energy and effective duration.

| Spark at | Max. Power, Watts | Total Energy, Joules | Eff. Energy, Joules | Eff. Total, Per Cent | Effective Duration, Seconds |
|----------|-------------------|----------------------|---------------------|----------------------|-----------------------------|
| 10° | 44.25 | 0.0659 | 0.0497 | 75.4 | 0.00146 |
| 40° | 46.80 | 0.0895 | 0.0770 | 86.0 | 0.00195 |
| 70° | 46.12 | 0.0669 | 0.0557 | 83.2 | 0.00148 |
| 100° | 37.80 | 0.0472 | 0.0346 | 73.3 | 0.00107 |
| 120° | 36.90 | 0.0218 | 0.0138 | 63.3 | 0.00040 |

A study of the above results shows that all the sparks reached a comparatively high maximum power, but it will be noticed that before and after the 40 deg. position, which seems to be about the position for maximum spark in this magneto, the amount of energy involved in the spark drops off quite rapidly with an accompanying shortening of the effective duration. The last two sparks were low in energy and of short duration and would be very poor for ignition service.

In the total and effective spark energy values for the five different sparks at known armature positions, we

have data with which to plot the true sparking range of the magneto for the speed at which it was tested.

The above energy data are plotted against armature position in the curves shown in Fig. 7. Included in this figure in dotted line is also the stored energy curve shown in Fig. 7 of the article referred to in the opening paragraph of this article.

In general, the difference between the amount of stored energy for any armature position and the amount delivered to the spark for the same armature position gives directly the amount of energy spent in iron and copper losses during sparking.

For the early armature positions, i.e., in the neighborhood of 10 deg., this does not hold true, because, as previously pointed out, energy is generated and delivered directly into the spark. However, for the 40 deg. position, a very good idea of the amount of the losses accompanying sparking can be obtained.

Losses Coincident to Sparking

The total loss for the 40 deg. position is seen to be the difference between 0.137 joule stored and 0.0895 joule delivered and equals 0.0475 joule, or 34.7 per cent of the energy available and 53.1 per cent of the total energy actually delivered.

Of this amount, the copper loss was found by the use of the equation

$$W_c = \int_0^t i^2 R \delta t, \quad (7)$$

which for the 40 deg. position gives an energy loss of 0.0058 joule. Copper loss during sparking is therefore seen to be very small.

The iron loss by difference is therefore

$$W_i = 0.0417 \text{ joule}$$

or 30.4 per cent of the energy stored and 46.5 per cent of the total energy delivered to the spark.

This high iron loss can be attributed to the very quick shift of magnetic flux in the magnetic circuits of the machine during the very brief period in which the phenomena of sparking occur, and it would seem that there ought to be room for considerable improvement in magnetic circuit design in this type of magneto, inasmuch as the machine analyzed is representative of the type.

Magnetic Motion During Sparking

Fig. 8 is shown to give an idea of the magnetic shift that takes place during sparking. This diagram shows the loops of reactive flux dying out across the turns of the coil on both sides of the machine, in the direction of the arrows indicating flux motion. As the reactive flux dies out toward the magnetic center on each side of the coil, the excitation flux will also sweep across the coil turns to take its natural path from the lower tip of the positive pole up through the armature core to the upper tip of the negative pole. In making this sweep it follows the reactive flux in motion, so that the induced voltage producing the spark current is caused by the combined flux shifts represented by the expression $\delta(\phi + \phi_r)/\delta t$ as shown. The magnetic lines shown in dotted lines illustrate the magnetic flux distribution just before the "break" took place.

The fact that practically all the flux reverses its path completely in the armature core and sweeps across the total embrace of the pole pieces in the very short interval of about 0.002 second ought to explain why the iron loss during sparking is relatively very high.

It may be of interest to know what factors determine the duration of a spark resulting from the interruption of an energized circuit.

Every electrical circuit has what is known as a time-constant that expresses the time required for the energy to increase or decrease in response to changed conditions.

This time-constant is roughly defined as being proportional to the inductance of the circuit divided by the circuit resistance, and the relation is such that if the inductance is expressed in henrys and the resistance in ohms, T will be the time in seconds for the energy to go through a certain percentage of the total change due to a change in circuit conditions. In its general form it is expressed as follows:

$$T, \text{ seconds} = \frac{L, \text{ henrys}}{R, \text{ ohms}} \quad (8)$$

It will, however, be found that T is a fair criterion of the sluggishness or the alertness of an electrical circuit.

The instantaneous resistance of the circuit during the sparking phenomena was shown to be $(R + r_s)$, so that the time constant of the circuit for any instant during sparking becomes

$$T = \frac{L}{R + r_s} \quad (9)$$

From this equation it is evident that the circuit "quickens" as r_s increases during the life of the spark, as shown by the values of r_s given in the table calculated from Fig. 2.

As an example of the use of equation (9), the following substitutions are made in that equation.

The inductance L of the circuit for the 40 deg. armature position of the magneto tested was shown in Fig. 6 of the article previously referred to, to be about 0.138 henry. The resistance of the winding was 4.02 ohms. Taking the value of the spark resistance at the instant one-half the effective energy was spent as an average value, the resulting value of T as the time-constant for that instant ought to be about equal to the effective duration of the spark. The value of r_s equal to 84.2 ohms at an instant 0.001333 second after break is taken as about an average value. These values substituted in (9) give the following results:

$$T = \frac{0.138}{4.02 + 84.2} = 0.001565 \text{ second.}$$

Comparing this value with the 0.00195 second actually required for most of the energy to spend itself in the spark, and allowing for the limitations in the use of T for specific calculations, it is very evident that the prominent factors in equation (9) do control the duration of the spark.

These two prominent factors are the inductance of the circuit and the spark resistance. Of these two factors, the inductance depends upon the design of the circuits of the machine, while the spark resistance depends for its value at any instant upon the amount of contact point separation and the energy involved.

Since the energy available is independent of the rate of spark point separation, it is evident that the quicker the contact points separate the quicker the energy will be spent in the spark and the higher its power will tend to be. The spark will also increase in volume for higher rates of contact point separation. Thus it is seen that a magneto of this type depends in a measure upon the igniter for the character of its behavior, as well as upon its own characteristics.

In the case of a high-tension magneto, an analysis of the sparking ability can be made in the same general way as that herein shown for the low-tension magneto, by making similar tests upon the interrupted primary circuit with the condenser disconnected. It would also be preferable to make the tests with the secondary removed if possible. The results thus obtained, supple-

mented with tests made with the secondary in place and the condenser connected and including records of the high-tension spark current, would give a very complete analysis of the high-tension type machine.

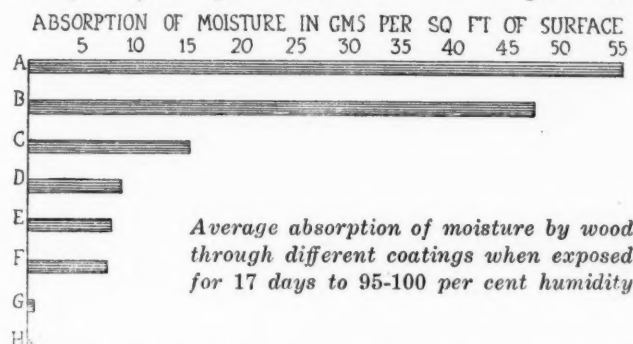
Aluminum Leaf to Moisture-Proof Wood

A VERY effective agent for moisture-proofing wood has been found in an aluminum leaf coating. This coating practically insulates the wood against any change in atmospheric conditions, and is therefore particularly valuable for use where exceedingly accurate form and balance must be maintained, as in an airplane propeller.

The comparative effectiveness of aluminum leaf, spar varnishes, enamels and other water resistant finishes tried out by the Forest Products Laboratory is shown in the accompanying graph. Aluminum leaf coating, it will be seen, is about 25 times as moisture resistant as the average spar varnish.

Two types of aluminum leaf finishes have been used, which are about equally impervious to moisture. One makes use of spirit varnish and the other of oil varnish, the successive coats being as follows:

Spirit Varnish Type—Filler plus 1 or 2 coats of orange shellac plus 1 coat spar varnish used as a size plus 1 coat



aluminum leaf plus 2 coats of orange shellac with desired color plus 1 coat spar varnish.

Oil Varnish Type—Filler plus 1 or 2 coats spar or rubbing varnish plus 1 coat spar varnish used as a size plus 1 coat aluminum leaf plus 2 coats spar varnish or enamel.

Coating wood with metal leaf is not nearly so slow a process as laying leaf in sign-making. As soon as the size reaches the right condition, the leaf can be applied directly from the book without the aid of gilders' tips or necessity of skilled workmanship. The time required to apply leaf to a propeller should not be more than 40 or 50 minutes, and this could be reduced as the finisher becomes more experienced.

It is important to allow the size to reach the proper condition before attempting to lay the leaf; the right point is just before the varnish sets dust free. The time required to reach this condition varies with the type of varnish used, but for spar varnishes it is usually from 1½ to 2 hours after application. The workman will soon learn how to judge the condition of the size by touching it lightly with his fingers. The size will dry much quicker if it is thinned about one-fourth with turpentine. It should be applied as sparingly as possible.

To apply the complete finish of the spirit varnish type requires in the neighborhood of 10 hours and to dry the various coats about 90 hours, making the total time about 100 hours. The oil varnish finish takes longer to dry and would probably total 240 hours. The latter finish is possibly the more durable coating.

BALL bearings have been extensively adopted in Germany during the war on account of the scarcity of oil and the small quantity required by this type of bearing, it being found possible to run continually for six months on one charge of oil. Reduced friction and the fact that these bearings could be made entirely of steel, when brass and other suitable metals were difficult to obtain, also contributed to their general adoption.

New DeDion Eight-Cylinder Model

Many Former DeDion Features Discarded—Gearbox Unit with Engine and Rear Axle of Conventional Design—Gear Drive for Camshaft

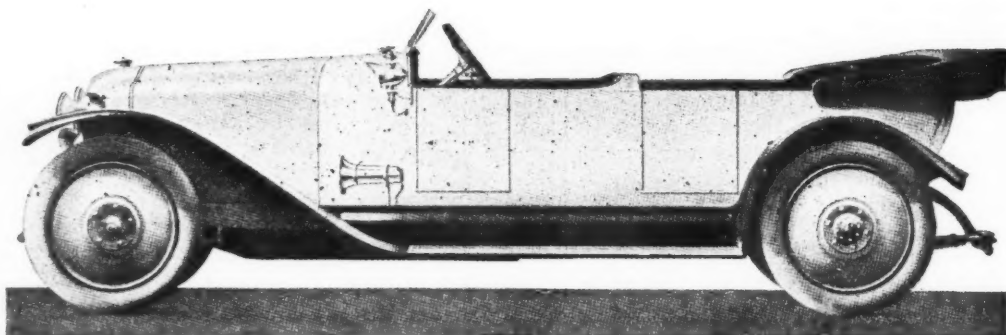
THE type H G DeDion-Bouton, which is one of the new post-war models, is an eight-cylinder design, with 70 x 120 mm. cylinders, and is made with 134 $\frac{3}{8}$ -inch wheelbase. It incorporates many innovations in DeDion-Bouton construction, among which might be mentioned hinging the gearbox as a unit with the engine and the use of a conventional

type of rear axle in which the drive-shafts are carried in the axle housing instead of the dual type of DeDion formerly used, which incorporated a solid one-piece construction for supporting the load and the differential carried on the frame with cross-shafts driving to the wheels.

In 8 weeks a series of 250 chassis will be under construction in the Paris factory and deliveries will start in America toward the end of May.

The greatest changes made are the elimination of chains in the motor for driving the camshaft and accessories, and the driving of these by gear. The camshaft is made with sixteen cams instead of eight. In other words, there is a separate intake cam for each pair of cylinders. Formerly small levers were interposed between the cams and the valve tappets, but these have been eliminated and now the tappets bear directly on the cams.

Larger hollow wrist pins are used. Pistons are made of special aluminum alloy, which formerly were of cast iron.



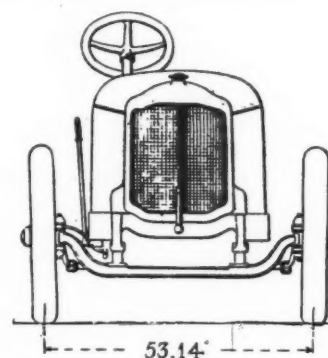
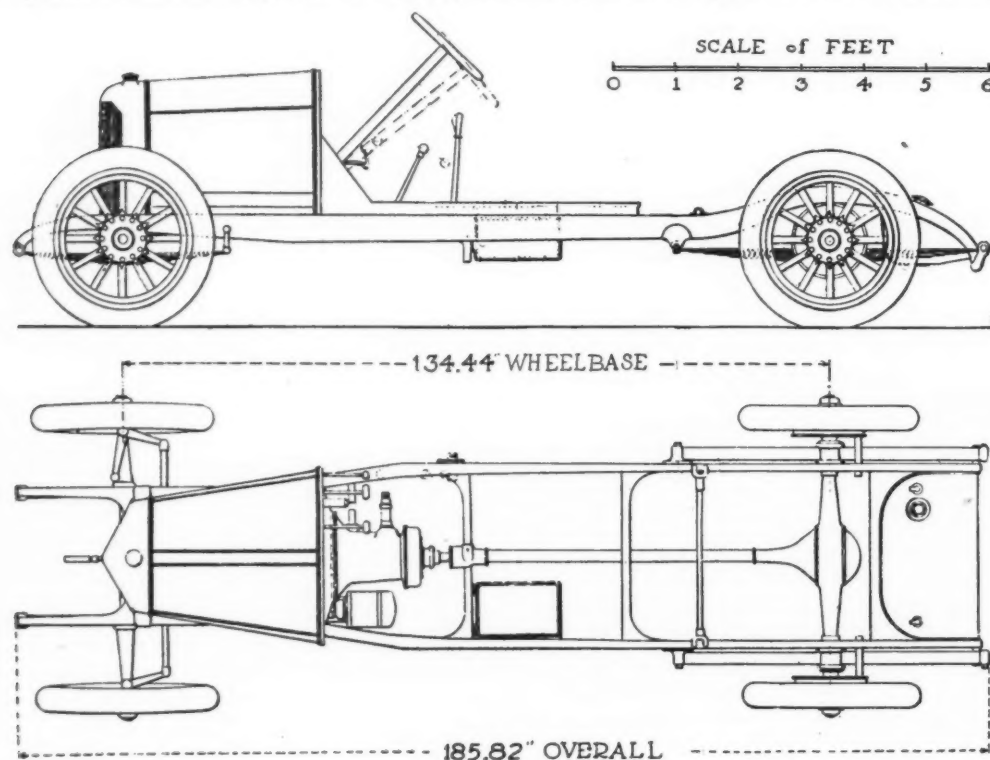
Larger diameter valves are used and are placed in side pockets, the same as formerly. The valve stems do not parallel the cylinder bore, but are placed at an angle thereto, so as to reduce the volume of the valve pocket.

The electric lighting and starting system is the DeDion-Bouton, of 12 volts, with dynamo and starter in one unit mounted on the gearbox to the left side and driven by a silent chain.

A new design of clutch is employed, permitting of passing from fourth to low as easily as it was formerly to go from fourth to third at 20 m.p.h. No couplings are used between the engine and the clutch.

Either Michelin disk wheels or special demountable artillery wood wheels are furnished. The tire sizes are 880 x 120 mm., which is approximately 34 x 4 $\frac{1}{2}$.

A hollow aluminum steering wheel, finished with baked enamel, is used. The worm and sector type of steering gear is used. There are three brakes—expanding serv-



Dimensioned drawings of DeDion chassis, showing side and front view and plan

ice type on rear of the gearset and expanding type on the rear axle, both sets being faced with Raybestos. Adjustable control pedals are used. The accelerator pedal is used for the first time by DeDion.

Special flat semi-elliptical springs are used front and rear, the rears measuring approximately 59 inches in length and the fronts 39 inches. Fan belt drive is used. There is a four-speed gearbox with shaft in a vertical plane. The rear axle is a floating type with stamped housing and helical gears.

The radiator is a V-type with a core housed in a red copper frame. Thermo-syphon cooling is used. The steering gear is on the right side. The hood is made in two parts and separately hinged so that one can be entirely removed without disturbing the other. Pressure or vacuum fuel feed is used. When pressure feed is used there is an auxiliary tank on the dash, of 50 litres, or a little over 13 gal.

The speedometer is driven from the gearset brake-drum. The chassis with 1500 lb. of dead weight in passengers did over 60 m.p.h. The tread is standard of 56 in.

In August the DeDion-Bouton company will have a new eight-cylinder, 12-30 hp. car which will follow the same general design as this model, which is rated at 18-40 hp. In December DeDion-Bouton will market a Grand De Luxe model with sixteen cylinders. The DeDion-Bouton factory has been trebled in capacity since 1914. It has recently purchased the Vinot et DeGniguand plant and also purchased a lumber yard and distillery so that they will have capacity for their large new plant which is contemplated. A new body building plant has been built.

DeDion-Bouton will shortly open up a New York sales-room under the direction of E. Lascaris and J. H. Stelling as sales manager, both of whom have been with the company for many years.

A Striking British Post-War Car

THE car illustrated is a product of the Arrol-Johnston Co. of Dumfries, Scotland. It is remarkable for being well out of the ruck of pre-war European car design and for having much in common with American practice. Mechanically its chief features are overhead valves in a detachable cylinder head, a 2:1 stroke bore ratio, a four speed and reverse gear with central lever control, a spiral bevel gear axle and center fulcrumed cantilever spring suspension in the rear. Another characteristic is the remarkable lightness, the chassis complete with tires and electric starter and generator weighing only 1344 lb., and the complete car well under 2000 lb. A glance at the layout will show traces of American influence, making for cheapening and expedition of quantity production. The car has been well received, where seen, but it will be some time before deliveries can be looked for.

There are four cylinders with overhead valves and a demountable head. The bore and stroke measures 75 mm. by 150 mm. (nom. 3 in. by 6 in.). The equipment includes a separate unit dynamo and electric starter, h.t. magneto ignition, carbureter, forced water and oil circulation, the water pump being enclosed and of special design, and the oil pressure-fed to all bearings.

The clutch is an internal cone faced with asbestos fabric. There are four changes of speed and a reverse, with central gate change lever; i. e., the lever is over the gearbox. A special lubrication system is fitted, dispensing with the usual practice of removing the gearbox lid for filling. The rear

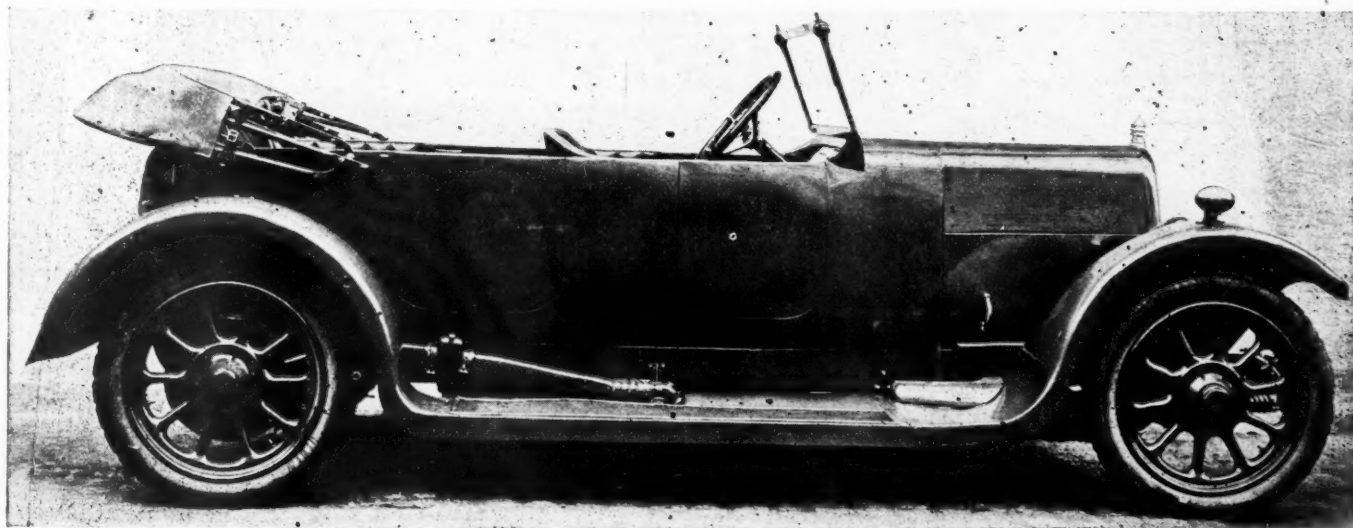
axle drive is by a spiral-bevel gear, with special provision for self-lubricating, the hubs being furnished with self-adjusting oil retainers and ball bearings.

The steering gear is a worm and sector with special provision for adjustment. The hand wheel is 18 in. in diameter, and the steering post contains in a special casing the control levers and speedometer and oil gages. The steering rods have a novel form of oil-retaining joint which dispenses with the hitherto-used dust-excluding gaiters. The fore axle is a high-grade steel forging and has a special form of oil-retaining swivel, and in this and other respects the layout is designed for easy steering.

There are two brakes, the one being behind the gearbox and the other (a pair) within the rear wheel hubs. The shoes are interchangeable and measure 15 in. in diameter.

The frame is of channel section pressed steel of extra depth and is cross-tied by tubes secured in suitable socket flanges. The fore suspension is on flat leaf springs and the rear is on flat cantilever type leaf springs. The before-noted special self-lubricating means in this connection need only be recalled. The wheels are of steel and detachable and shod with 820 mm. by 120 mm. tires (nom. 32 in. by 4 3/4 in.).

The wheelbase and track measure 10 ft. by 4 ft. 8 in. There is a minimum ground clearance of 10 in., and the frame is 20 in. from the ground. The chassis has a gross weight of 1344 lb. It is interesting to note that only two sizes of bolts and nuts and two diameters in ball bearings are used.



New Arrol-Johnston car, the chassis of which is suggestive of American practice. The sales price is \$3,500

King-Bugatti 16-Cylinder Aero Engine

PART II

Consists Virtually of Two 8-Cylinder All-in-Line Engines Mounted on a Common Crankcase and Geared to a Common Propeller Shaft—Designed to Permit a 37-Mm. Cannon to Shoot Through Hollow Propeller Shaft

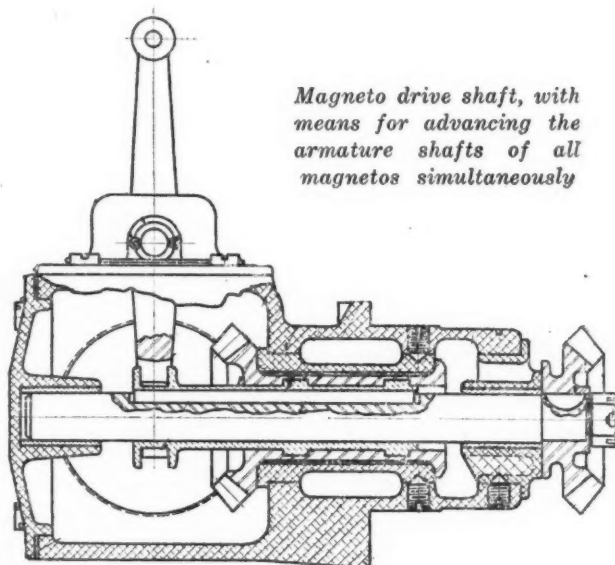
FOUR specially designed Miller carbureters are used, each supplying one block of four cylinders through separate water-jacketed manifolds. They are set low so that gravity feed may be used.

The throttle valve is of the barrel type. the axis of all valves is parallel with the center line of the engine, the two carbureters on each side of the engine being operated by one shaft which is connected to the valves at each end through adjustable couplings. The shafts on the two sides of the engine are connected so that all four valves move in unison, the valve opening being synchronized by means of the adjustable couplings.

Gasoline is drawn into the jet through the small hole in the bottom of the threaded end, mixing with a certain amount of air sucked in through the four holes drilled in the barrel of the jet just above the threaded portion. This air is taken from the outside through the upper 3/16-in. hole in the jet holder and passes down around the outside of the jet to the four holes mentioned above. The major portion of the air enters the carbureter through the lower end of the venturi, which is 3 in. in diameter, passes up around the jet bar holder, combining above this with the rich mixture from the jets to form the proper mixture for combustion.

Assembly of the altitude valve is shown. This valve operates by turning a lever which is attached to the altitude control valve. This valve has two openings in its seat, which when in the open position register with two similar openings in the stationary cover, thus making two free passages to the outer air.

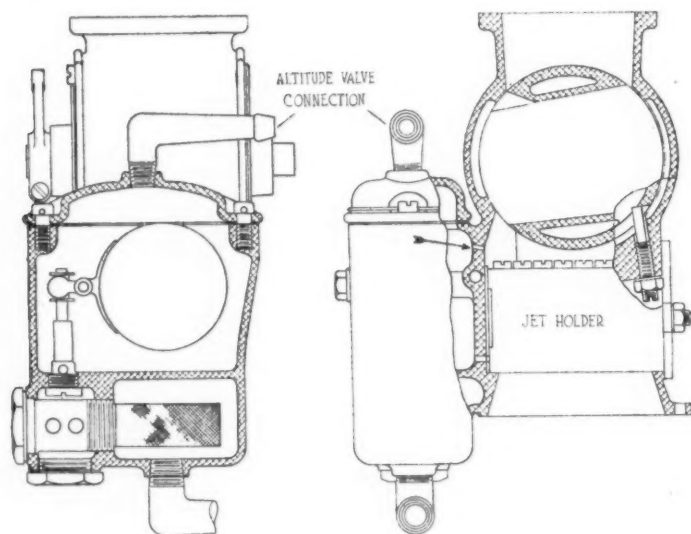
There are four outlets, one of which connects to each of the four elbows, opening directly into the top of the float chamber. The float chamber is always in direct connection with the venturi through a 5/64-in. drilled hole opening into the venturi about 1/4 in. above the jet holder and into the float chamber well above the gasoline level. Opening the altitude control valve decreases the vacuum in the float chamber, thus increasing the flow of gasoline through the jets.



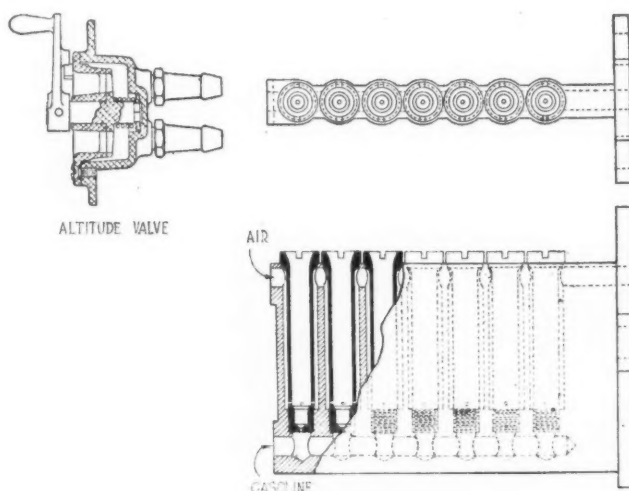
Magneto drive shaft, with means for advancing the armature shafts of all magnetos simultaneously

Ignition is by four Dixie 800 magnetos, two on each side of the engine, driven from the vertical camshaft driving shaft by bevel gearing. All magnetos turn clockwise. Two Titan A-C spark plugs are used per cylinder, located in the side of the combustion chamber.

The rear magneto on the right-hand side supplies current to the rear plug in each of the eight left-hand cylinders, the front magneto on the right-hand side supplying current to the front plug in each of the eight right-hand cylinders. The same arrangement is followed with the magnetos on the left-hand side, so that the two magnetos in either side will fire all sixteen cylinders. Magnetos are set for a maximum advance of 38 deg.



Two sectional views of Miller carburetor



Detail of altitude control valve and multiple nozzle

The bevel gear on the magneto shaft is fitted on a taper with a key. The gear has eight keyways, six spaced 48 deg., one spaced 42 deg. and one spaced 30 deg. This in combination with the gear teeth allows the magneto to be set within $1\frac{1}{2}$ deg. on the crankshaft.

The magneto advance and retard mechanism is shown in one of the illustrations.

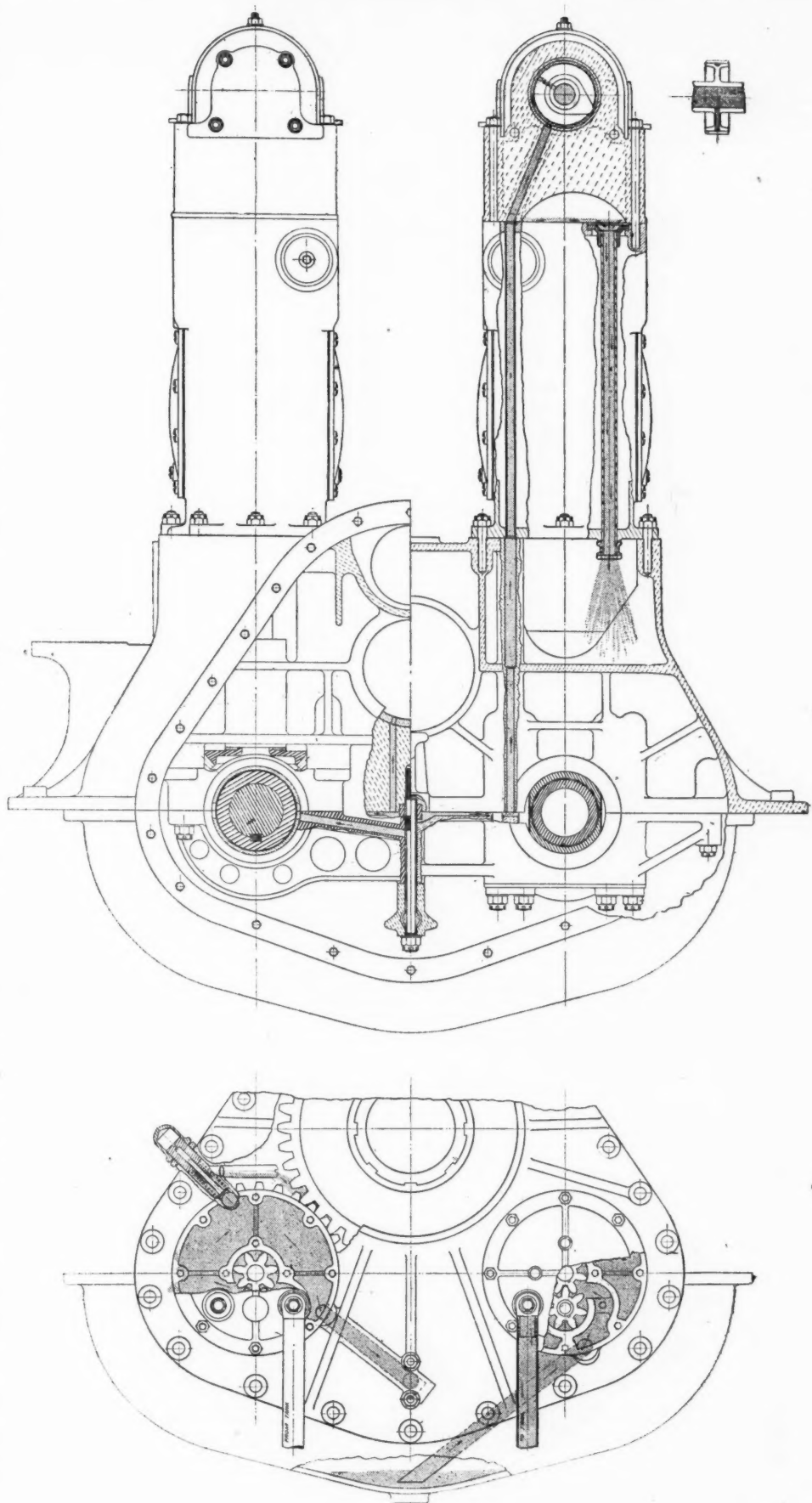
The bevel gear within the housing meshes with the gears on the magneto shafts. This gear has four internal helical grooves sliding over splines on a sleeve which is keyed to the driving shaft but may be moved along the shaft by a lever. The movement of this sleeve revolves the magneto driving gear in relation to the shaft driven directly from the crankshafts cut, thus advancing or retarding the magnetos. The levers on the two sides of the engine are operated from one shaft located above the crankcase between the cylinder blocks, the connections to the levers being through adjustable yokes so that the magnetos may be synchronized.

Oiling System

Oiling is by means of pressure feed and spray. There are one pressure and one scavenging pump, both of the gear type. These are located at the front of the engine, driven directly from the crankshafts through a pin and slotted coupling. This coupling is squared to the pump shaft, but is not pinned, thus relieving the shaft of any end driving pressure. The gears in both pumps are the same, except that the scavenging pump gears have a wider face.

Oil, after passing through a strainer, is drawn from the supply tank by the pressure pump, which is driven from the right-hand crankshaft. This oil is forced into the pressure line running the entire length of the crankcase. An adjustable pressure-regulating valve is located in the crankcase front gear cover. It is of the poppet valve spring-seated type and discharges the excess oil directly onto the propeller shaft driving gears. This valve is generally set so that the pressure gage, which is connected to the rear end of the main oil line in the crankcase, registers about 30 lb. This valve has holes drilled through the head so that there is always a certain amount of oil discharged onto the gears.

From the pressure line the oil passes up around the studs which hold this line in position to an oil passage cut along the top surface of the crankshaft bearing cap. For the center crankshaft bearing this oil is carried through a drilled hole. These passages carry the oil to all the main crankshaft bearings. All the main crankshaft bearings



Sketches showing details of lubrication system

Weights, Dimensions and Other Data of King-Bugatti Engine

GENERAL DATA

Material of cylinders Cast iron
Bore 4.33 in. (110 mm.)
Stroke 6.3 in. (160 mm.)
Stroke-bore ratio 1.455 : 1
Area of one piston 14.725 sq. in.
Total piston area 235.6 cu. in.
Swept volume of one cylinder 92.768 cu. in.
Displacement of motor 1484.288 cu. in.
Compression ratio 5:1
Normal brake horsepower, 410 at 2000 r.p.m.
Ratio propeller to crankshaft speed666 : 1

VALVES

Number per cylinder Two inlet and one exhaust
Outside diameter, inlet 1.535 in.
Outside diameter, exhaust 2.263 in.
Port diameter, inlet 1 27/64 in.
Port diameter, exhaust 2 3/64 in.
Width of seat, inlet057 in.
Width of seat, exhaust108 in.
Angle of seat 10 deg.
Valve lift, inlet653 in.
Valve lift, exhaust700 in.
Diameter of stem, inlet357 in.
Diameter of stem, exhaust (large)591 in.
Diameter of stem, exhaust (small)4355 in.
Length of valve, inlet 5 17/64 in.
Length of valve, exhaust 5 13/32 in.
Length of spring in position, inlet (small) 2 7/64 in.
Length of spring in position, inlet (large) 2 15/64 in.
Length of spring in position, exhaust (small) 2 27/64 in.
Length of spring in position, exhaust (large) 2 27/64 in.
Main diameter of coils, inlet spring (small) 57/64 in.
Main diameter of coils, inlet spring (large) 1 9/32 in.
Mean diameter of coils, exhaust spring (small) 1 9/32 in.
Mean diameter of coils, exhaust spring (large) 1 23/32 in.
Clearance valve stem015 in.

CYLINDERS

Overall height of cylinders 10 27/64 in.
Length of projection in crankcase 3 1/16 in.
Width of cylinder casting at head over water jacket space 5 7/16 in.
Width of cylinder casting at barrel over water jacket space 5 1/16 in.
Length of cylinder casting over water jacket 19 5/32 in.
Thickness of flange (base) 7/16 in.
Number of studs per block of four cylinders 20
Diameter of stud 5/16 in.
Thickness of water jacket side wall and head 5/32 in.
Thickness of combustion chamber wall 13/64 in.
Thickness of cylinder barrel, above flange at water jacket 3/16 in.
Thickness of cylinder barrel, above flange below water jacket 7/32 in.
Thickness of cylinder barrel below flange 9/64 in.
Thickness of valve ports 5/32 in.
Diameter of port at valve, inlet 1 27/64 in.
Diameter of port at valve, exhaust 2 3/64 in.
Inlet port at flange (for two cylinders) 2 9/32 x 1 1/8 in.
Exhaust port at flange (for one cylinder) 2 3/64 x 1 31/64 in.
Number of spark plugs per cylinder 2

PISTONS

Material Aluminum
Length of piston 4 1/16 in.
Length to diameter ratio938 : 1
Position of rings Above gudgeon pin
Width of rings 3/4 in.
Width of land 1/4 in.
Distance from bottom to center of gudgeon pin 2 1/16 in.
Thickness of head at center 1/4 in.
Thickness of head at edge 3/8 in.
Thickness of wall at bottom 3/8 in.

GUDGEON PIN

Diameter of gudgeon pin 1 5/64 in.
Thickness of wall164 in.

CONNECTING ROD

Type Plain
Length between centers 10 7/16 in.
Ratio length to crank throw 3.313 : 1
Small end bearing Bronze bushing
Outside diameter of bushing 1 3/16 in.
Length of bushing 2 3/32 in.
Length of small end of rod 2 3/32 in.
Outside diameter small end of rod at end 1 11/32 in.
Outside diameter small end rod at center 1 1/2 in.
Type of section Eye
Depth (small end) 1 1/4 in.
Depth (large end) 1 7/32 in.
Width 5/8 in.

Thickness of web 5/32 in.
Thickness of flange (small end) 5/32 in.
Thickness of flange (large end) 13/64 in.
Large end bearing Bronze babbitt lined
Inside diameter bushing 2 3/16 in.
Outside diameter bushing 2 1/2 in.
Length 2 9/64 in.
Thickness of babbitt 3/64 in.

CRANKSHAFT

Number of crankshafts 2
Number of bearings (plain) 9
Number of bearings (ball) 1
Cylinder centers (in block) 4 17/32 in.
Cylinder centers (between blocks) 15/32 in.
Crank pins (outside diameter) 2 3/16 in.
Crank pins (inside diameter) 1 1/8 in.
Length 2 11/64 in.
Main Bearings—
Outside diameter, Nos. 1, 2, 3, 4, 6, 7, 8, 9 2 3/16 in.
Outside diameter, No. 5 2 5/8 in.
Inside diameter, Nos. 1, 2, 3, 4, 6, 7, 8, 9 1 1/8 in.
Length, Nos. 1, 2, 3, 4, 6, 7, 8 bearing bushings 1 9/16 in.
Length No. 9 bearing bushing 2 19/32 in.
Length No. 5 bearing bushing 1 31/32 in.
Ball Bearing—Hess-Bright Monarch No 6211
Crank webs
Width 3 17/32 in.
Thickness 43/64 in.
Radius of fillets 3/32 in.
Weight of one complete shaft 96 1/2 lb.

CAMSHAFT

Diameter of shaft 1 in.
Inside diameter 11/16 in.
Number of bearings 10
Diameter of bearings Nos. 1 and 10 1 in.
Diameter of bearings Nos. 2, 3, 4, 5, 6, 7, 8, 9 2 1/4 in.
Length of bearings Nos. 1 and 10 1 5/16 in.
Length of bearings Nos. 2, 4, 7, 9 5/8 in.
Length of bearings Nos. 3 and 8 3/4 in.
Length of bearings Nos. 5 and 6 27/32 in.
Width of cam face 5/16 in.
Number of cams per cylinder 3

CAMSHAFT BEVEL GEAR

Pitch diameter 3 3/4 in.
Number of teeth 30
Pitch 8
Width of face 3/4 in.
Diameter of bolt circle 1 23/32 in.
Number of bolts 6
Diameter of bolts 5/16 in.

CAMSHAFT HOUSING

Material Aluminum

CAMSHAFT DRIVING SHAFT

Diameter 3/4 in.
Wall thickness 1/8 in.

CRANKCASE UPPER HALF

Material Aluminum
Thickness of wall 3/16 to 5/16 in.
Thickness of supporting flange 3/8 to 7/16 in.
Center distance of motor support bolts 24 3/4 in.
Number of motor support bolts 12
Diameter of motor support bolts 3/8 in.
Center to center of crank shafts 10 1/4 in.
Height of case 9.055 in.

CRANKCASE LOWER HALF

Material Aluminum
Thickness of wall 3/16 in.

LUBRICATION

Type Forced feed and spray
Type of pump Rotary gear
Number of pumps 2
Oil pressure One pressure, one scavenging
Oil pressure 30 lb.

PRESSURE PUMP

Number of teeth 7
Pitch 6
Outside diameter 1 1/2 in.
Width of face 13/16 in.
Ratio of pump speed to crankshaft speed 1 : 1

SCAVENGING PUMP

Number of teeth 7
Pitch 6
Outside diameter 1 1/2 in.
Width of face 1 1/4 in.
Ratio of pump speed to crankshaft speed 1 : 1

IGNITION

Type Magneto
Number 4
Make "Dixie 800"
Firing order, 1L, 7R, 5L, 4R, 3L, 8R, 7L, 2R, 4L, 6R, 8L, 1R, 2L, 5R, 6L, 3R.
Number of plugs per cylinder 2
Type of plug Titan A. C.
Advance 38 deg.
Magneto rotation Clockwise

COOLING SYSTEM

Type Water cooled
Pump 1 Centrifugal
Inside diameter of inlet and outlet elbow to cylinders 1 1/2 in.
Number of inlets 2
Number of outlets 2
Water temperature inlet 150° F.
Water temperature outlet 160° F.

WATER PUMP

Material Aluminum
Inside diameter of inlet 2 1/4 in.
Inside diameter of outlet 2 3/8 in.
Diameter of impeller 5 1/2 in.
Number of blades 8
Ratio pump speed to crankshaft speed 1 : 1

REDUCTION GEARS

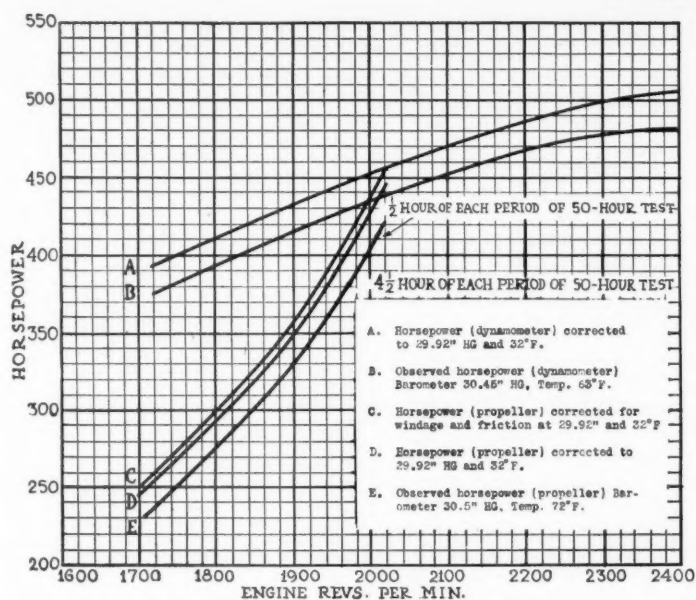
Crankshaft Propeller Drive Gear—
Pitch diameter 5.6 in.
Pitch 5
Number of teeth 28
Width face 2 3/8 in.
Diameter bolt circle 3 17/32 in.
Number of bolts 9
Diameter of bolts 7/16 in.
Propeller shaft gear:
Pitch diameter 8.4 in.
Pitch 5.0 in.
Number of teeth 42
Width face 2 1/2 in.
Number of splines 8
Width of splines405
Height of splines094

PROPELLER SHAFT

Number of bearings 3
Type of bearings Two ball; one plain
Ball bearings
..... No. 6219, special width, Hess-Bright
Plain bearing Bronze babbitt lined
Diameter of bearing 3 7/16 in.
Length of bearing 1 1/4 in.
Thickness of babbitt 1/32 in.
Outside diameter at gear (over splines) 3 3/4 in.
Outside diameter at rear end 3 5/16 in.
Outside diameter at propeller 3 31/64 in.
Inside diameter 2 61/64 in.
Diameter propeller flange 9 3/8 in.
Thickness flange 7/16 in.
Thickness loose flange 9/32 in.
Length of bearing loose flange on shaft 3/4 in.
Diameter of bolt circle 7 1/2 in.
Diameter of bolts 5/8 in.
Number of bolts 8

U. S. Bugatti 16-Cylinder Engine; Weights of Parts

| | Lb. | Oz. | | Lb. | Oz. |
|---|------|-----|---|-----|-----|
| Completely assembled engine, dry, without exhaust stacks | 1170 | | Oil pump assembly, complete, pressure | 2 | 6 |
| Crankshaft with propeller drive gear, bolts and nuts, bevel gear and oil passage shells | 96 | 5 | Oil pump assembly complete, scavenging | 3 | 6 |
| Cylinder assembly with valves, valve springs and retainers, and all studs | 79 | | Magneto "Dixie 800" | 16 | 13 |
| Piston | 1 | 11 | Magneto gear housing assembly complete | 3 | 14 |
| Valve rocker assembly | 0 | 5 | Carburetor assembly complete | 5 | 0 |
| Piston ring | 0 | 1 | Inlet manifold | 7 | 2 |
| Gudgeon pin with aluminum plugs | 0 | 9 | Camshaft assembly complete | 10 | 2 |
| Connecting rod, complete with cap, bushings, bolts and nuts | 3 | 8 | Inlet valve with springs and retainer | 0 | 9 |
| Water pump assembly complete | 6 | 2 | Inlet valve | 0 | 4 |
| Water pump impeller | 0 | 9 | Exhaust valve with springs and retainer | 1 | 1 |
| | | | Exhaust valve | 0 | 3 |
| | | | Valve rocker assembly | 0 | 5 |



and pins are hollow. All even-numbered main crankshaft bearings have a 3/16-in. radial hole drilled entirely through them. All the crankpin bearings have a 3/16-in. radial hole drilled from the inside to the central hole. A 13/64-in. hole is drilled in the web, both sides of even-numbered main crankshaft bearings connecting the central hole in the main and pin bearings. A copper shell is placed in these central holes and the ends are spun over, making an oil-tight joint. These shells are necked in the central portion so that a tubular oil space is left.

Oil from the passages in the crankshaft bearing cap is forced into this tubular oil space through the 3/16-in. holes which register with this passage twice per revolution. From here the oil passes to the pin bearings, the leakage from these bearings being thrown on the cylinder walls and piston pins, thoroughly lubricating these parts.

Four vertical holes are drilled in the crankcase web connecting with the oil passages in crankshaft bearing caps Nos. 3 and 7. These holes register at the top of the crankcase with copper tubes which pass through the cylinder water jacket space, registering at the top of the cylinder block with four holes drilled in the webs of the crankshaft housing. These holes register with an oil groove of 3/64 in. radius cut entirely around camshaft bearings Nos. 3 and 8, right and left. A No. 35 drill hole connects the oil grooves with the interior of the hollow camshaft. Oil is thus carried under pressure to the hollow camshaft. From the hollow camshaft the oil passes to camshaft bearings Nos. 1, 2, 4, 5, 6, 7, 9 and 10 through a No. 35 drill hole. Camshaft bearing bushings Nos. 2, 4, 7 and 9 have a 3/32 in. by 1/32 in. oil groove cut full length of the bearing surface, the drilled hole in the camshaft bearing registering with this groove once per revolution, causing a small stream of oil to shoot out both sides of the bearing, thoroughly lubricating the cams, valve rocker shaft, rollers and valve stems. Camshaft bearing bushings Nos. 5 and 6 have a 3/32 in. by 1/32 in. oil groove cut from 1/4 in. of the outer edge to the inner edge, the drilled hole in the camshaft registering with this groove once per revolution. Oil from this groove in the rear bearing lubricates the thrust surface of the camshaft bevel gear, while the small stream

from the front bearing thoroughly lubricates the camshaft and camshaft driving gears and the camshaft driving gear bearings.

A 3/16-in. hole is drilled in the crankcase web connecting with the oil groove in No. 6 crankshaft bearing cap and registering with a 1/16-in. drilled hole in the propeller shaft rear bearing bushing. This thoroughly lubricates this bearing. The oil flowing from this bearing returns to the sump by gravity.

The camshaft and magneto driving gears in the crankcase are lubricated by spray. The gearing in the camshaft housing is packed in grease. The crankshaft and propeller shaft ball bearings are lubricated by spray. Oil which drains to the bottom of the camshaft housing is returned by gravity to the crankcase through twelve pipes passing through the cylinder water jacket space. Oil which drains to the front end of the sump is returned to the oil tank by the scavenging pump. Oil which drains to the rear end of the sump is returned to the oil tank by gravity.

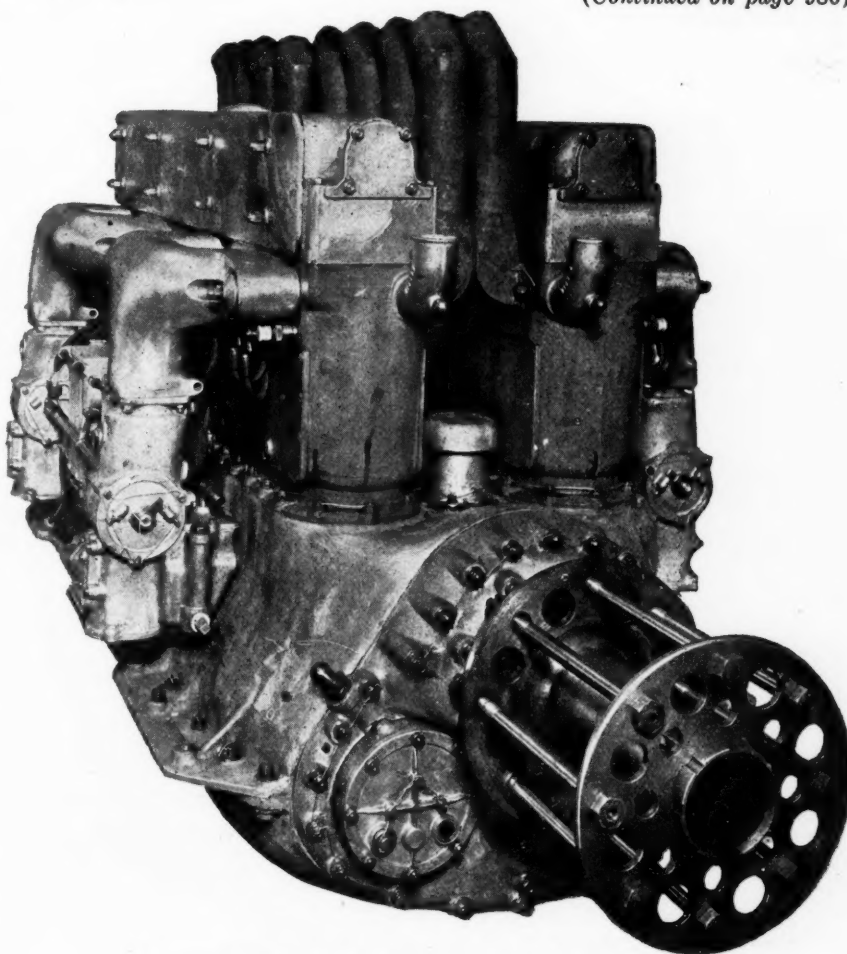
Cooling System

Cooling water is circulated through the engine by means of a centrifugal pump, driven from the rear end of the left-hand crankshaft by a pin and coupling, the same as used on the oil pump.

The cooling system from the pump inlet to the outlet elbows on the front cylinders holds 4 1/4 gallons of water. The pump impeller is 5 7/8 in. in diameter, with eight vanes, the web being drilled with eight 3/8-in. holes on a circle of 2 in. diameter to equalize the water pressure.

The pump shaft is packed with a graphited asbestos rope packing, automatically held under compression by a coiled spring acting on the gland. The pump shaft is hollow, the rear end being in direct communication with the water in the pump case. Water entering the shaft is forced out to the shaft rear bearing surface through a 1/8-in. hole. Any leakage of water past the asbestos packing is drained outside of the crankcase through a 5/8-in. cored hole in the water pump body.

(Continued on page 986)



Propeller end view of complete King-Bugatti engine

Fordson Assembly Wholly on Progressive Plan

PART II

Cylinder Block and Transmission Housing Assemblies Travel Along Parallel Lines Until Complete—Two Lines of Complete Tractor Assembly

By J. Edward Schipper

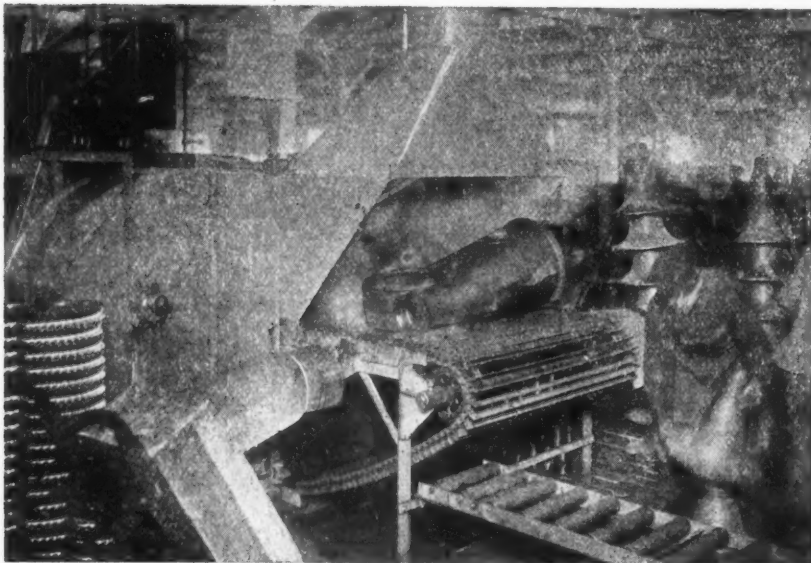


Fig. 14—Beginning the assembly of the transmission and rear axle. The roller conveyor comes from the manufacturing department, and the first operation is that of washing

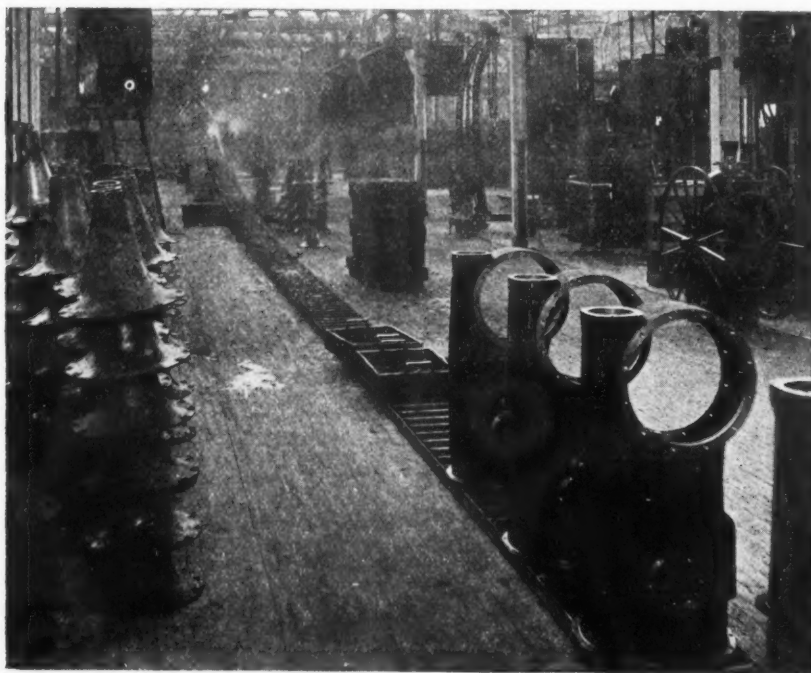


Fig. 15—Looking backward toward the washing machine, showing the incline down which the parts slide to the beginning of the transmission assembly track

ALL the large castings and heavy parts used in the assembly of the transmission and rear axle which are in any way likely to be soiled or greasy from manufacture are put through the large washing machine shown in Fig. 14. In this illustration one of the big castings used as the body of the Fordson tractor, and which houses the transmission and rear axle gears, may be seen starting through the washing machine. The operator is just lifting up a rear axle housing from the gravity conveyor from the manufacturing department ready to put this through the washing machine, and thus the heavy parts all pass through as indicated.

The way they leave the washing machine and run down a slope to bring them to the assembly line is seen clearly in Fig. 15, which is looking back toward the washing machine. The slope is apparent in the background, and as the different parts come down the line they are picked off the gravity roller conveyors and put in proper position for assembly. The rear axle housings have gained a little, and are shown here stored. The two pans on the conveyor contain small parts which have been washed.

As will be noted in Fig. 15, the large castings are allowed to remain on the conveyor, and, as a matter of fact, everything is timed according to these. They pass along the conveyor and reach the foot of the slope at the point shown in Fig. 16, which is the commencement of the transmission assembly chain.

One of the hooks upon which the transmission housing is caught up has just come around on the track wheel, and is apparent in the foreground of the photograph. The gears which are ready for assembly, and which have been previously assembled on their shafts by means of arbor presses, come down on the sloping carrier to the assembly tracks. The men only work on one side of this track. Transmission gears are assembled in place with the casting vertically held by the hook on the conveyor chain, hence the operator can drop them into place without excessive effort, and the hook carries the casting along in this position.

After the completion of all assembly work which can be done with the casting in an upright position, there is a turnover carrier

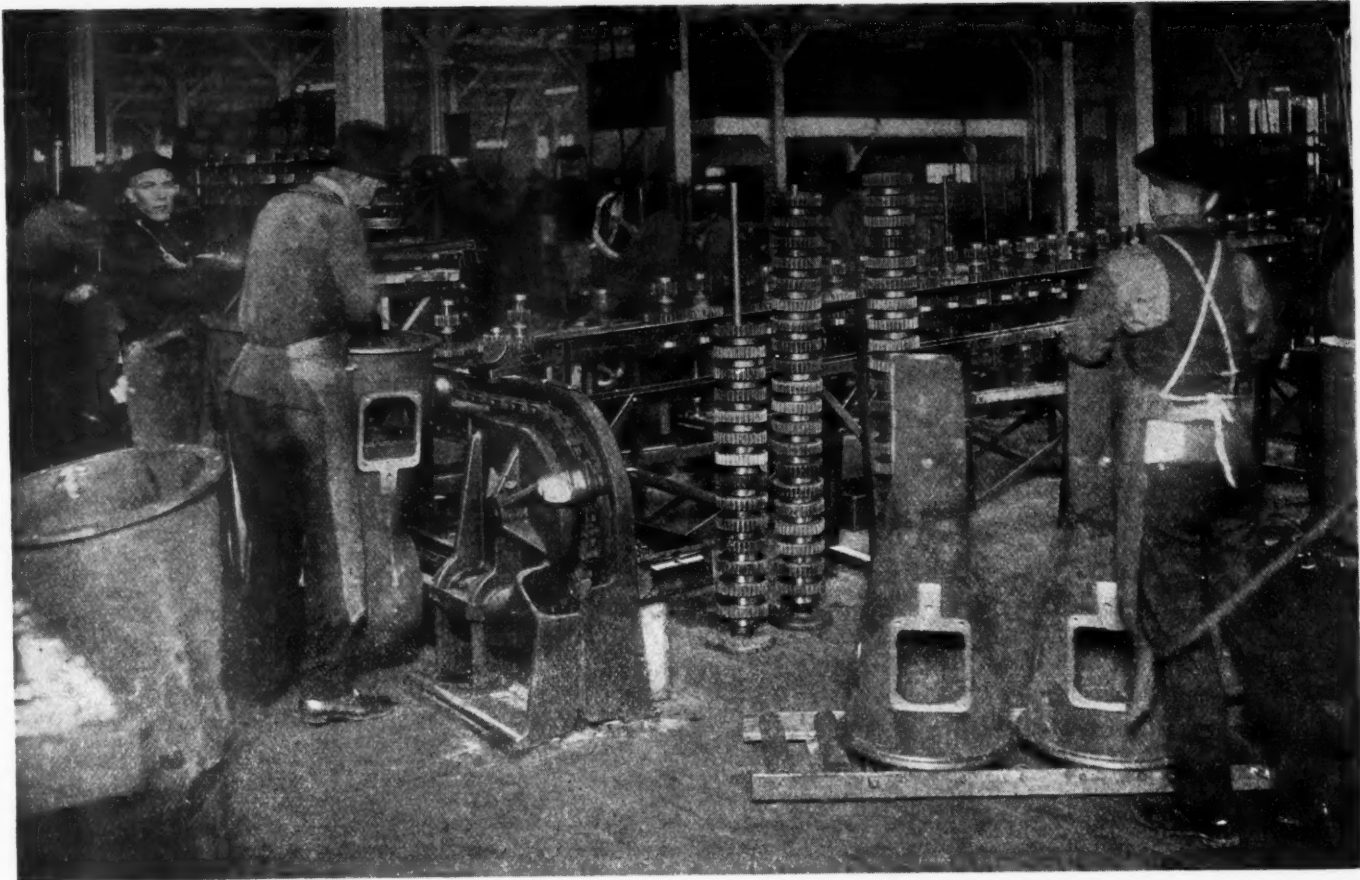


Fig. 16 — Looking ahead at the beginning of the transmission and rear axle assembly. Note the hooks on the chain which pick up the transmission housing and note the carriers from the arbor pressing department carrying the shafts with the gears in place

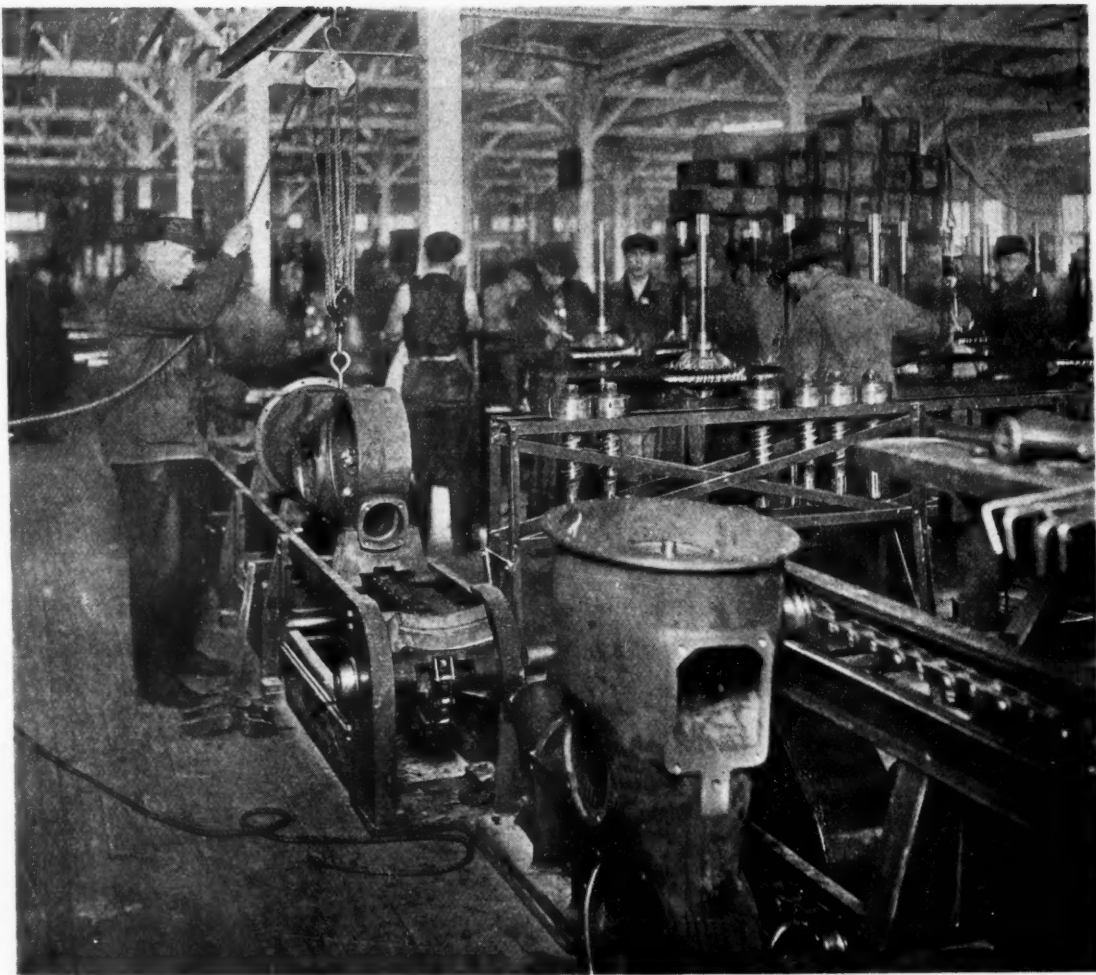


Fig. 17 — When the first assembly operations are complete, with the transmission housing in a vertical position, they turn over horizontally to the next section of the transmission assembly chain. This view shows the housing just about ready to turn over, and one is turned over in the background. Also in the background can be seen the preliminary sub-assemblies on the worm shaft and rear axle



Fig. 18—Section of the transmission housing assembly track, showing how the men work on both sides and how the nuts and bolts are carried in pans beneath the track. The bearings and bearing cases are held in containers close to the track. Men are working on both sides of this track, performing symmetrical operations

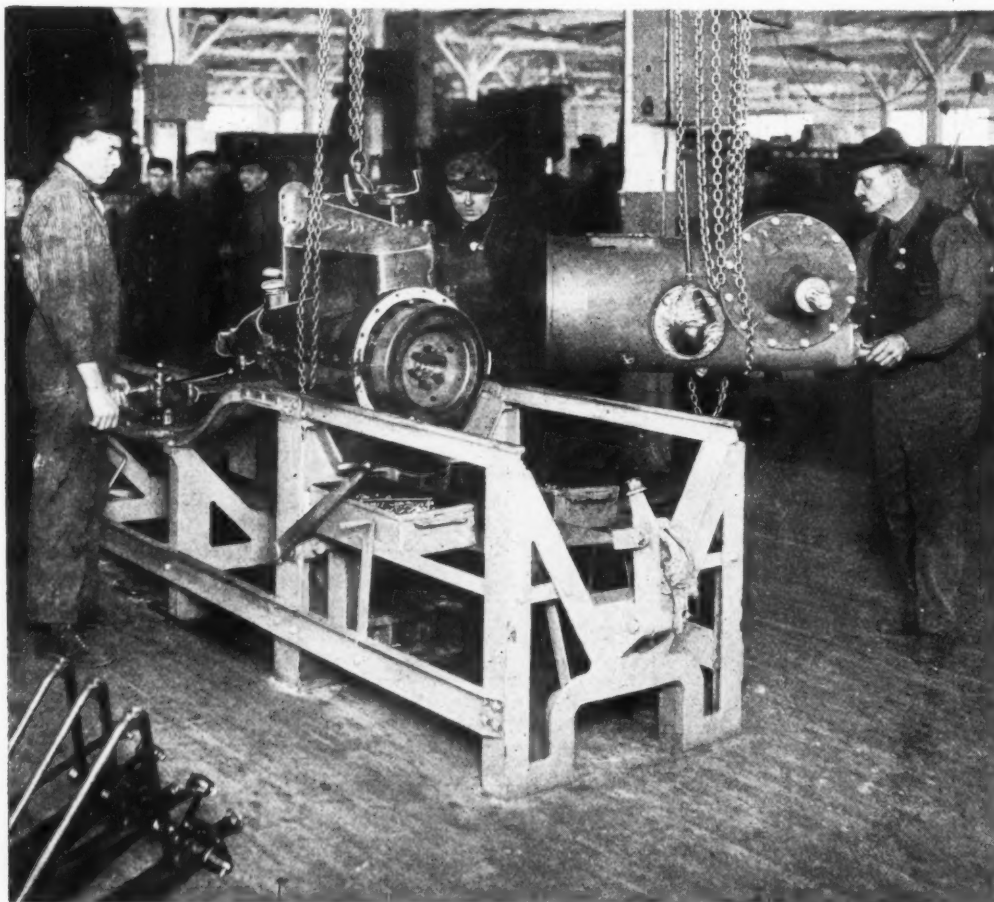


Fig. 19—When the completed transmission housing assembly reaches the end of the chain it is swung over to the beginning of the tractor assembly track. This starts out with a stationary stand upon which the halves are first bolted together before they are pushed down an incline and enter upon the moving track

which allows the casting to swing over horizontally. As shown in the foreground of Fig. 17, there are no intermediate steps between the vertical position and the horizontal position of the large transmission housing. It is immediately turned over on its side. The first operation to take place when in this position is to put in the final drive parts, including the worm shaft, worm wheel, etc. In the background of Fig. 17 may be noted the parts for the final drive coming down on the sloping racks utilized as feeders to the transmission chain.

On the transmission assembly, men are working on both sides of the chain in the same way as on the engine assembly, and it is interesting to note the storage beneath the chain of the necessary bolts, nuts, soft hammers, etc., for the operations performed above that point. Fig. 18 shows this very clearly, the pans beneath the track being continually filled by men assigned to this duty, who come along with scoops full of bolts, etc., to keep the pans replenished. The axle shafts

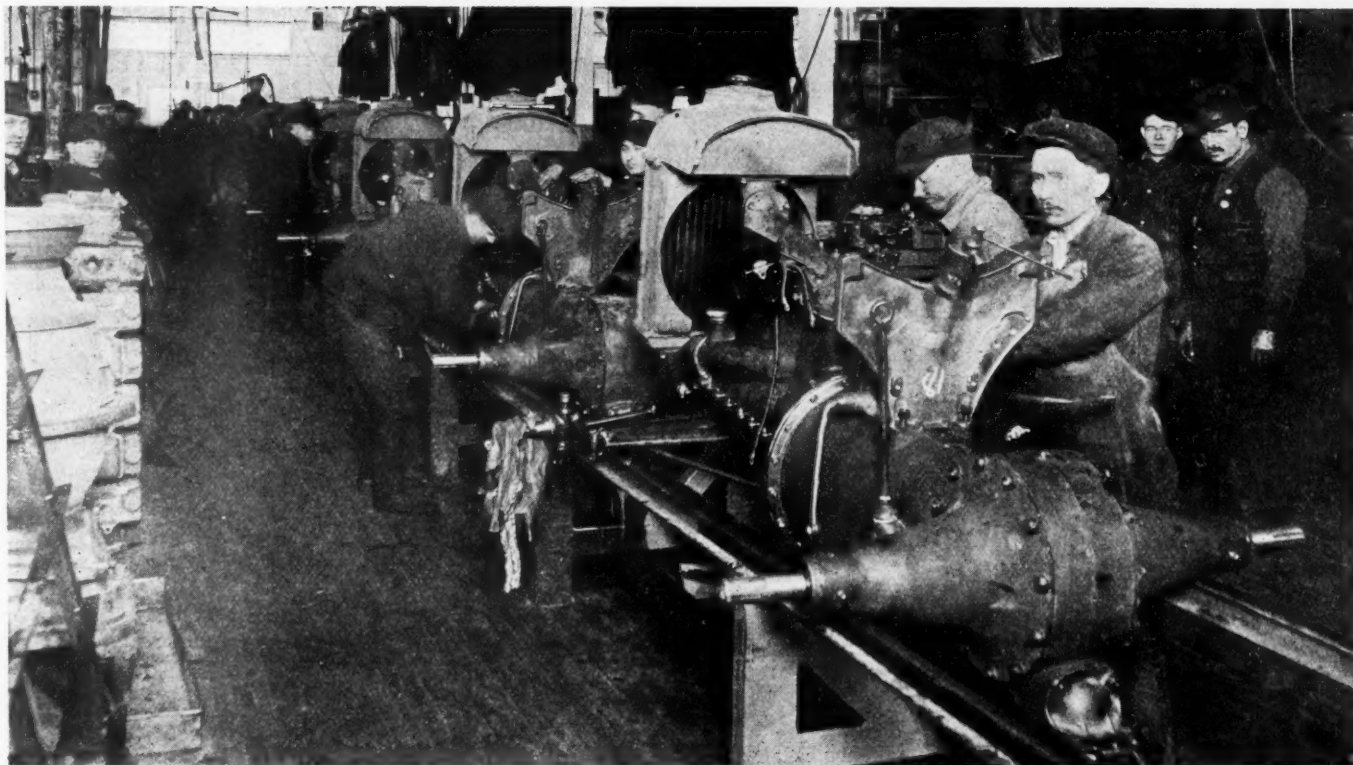


Fig. 20—Tractors moving along the tractor assembly track. In the foreground is a tractor which has just come down the incline and started on the track, and way in the background can be seen the open door through which the finished tractors leave the building

are shown here in position, and the next step, a little further on, is also seen in Fig. 18, which is putting on the rear axle housing. When this has been completed the transmissions are finished and are ready to be carried over to the beginning of the tractor assembly chain.

Final Tractor Assembly

An overhead crossover accomplishes this work. There are two tractor assembly chains and the finished transmissions and engines are fed alternately from each of the single engine and transmission lines to one of the tractor assembly chains. Fig. 19 shows the stand at the end of one of the tractor assembly chains ready to begin its journey down the final assembly tracks. This stand is stationary. One man brings the engine over, another the transmission, while men at the stand are ready to bolt the flanges together. While this is going on the coil box is brought over and mounted on the side of the engine. To the

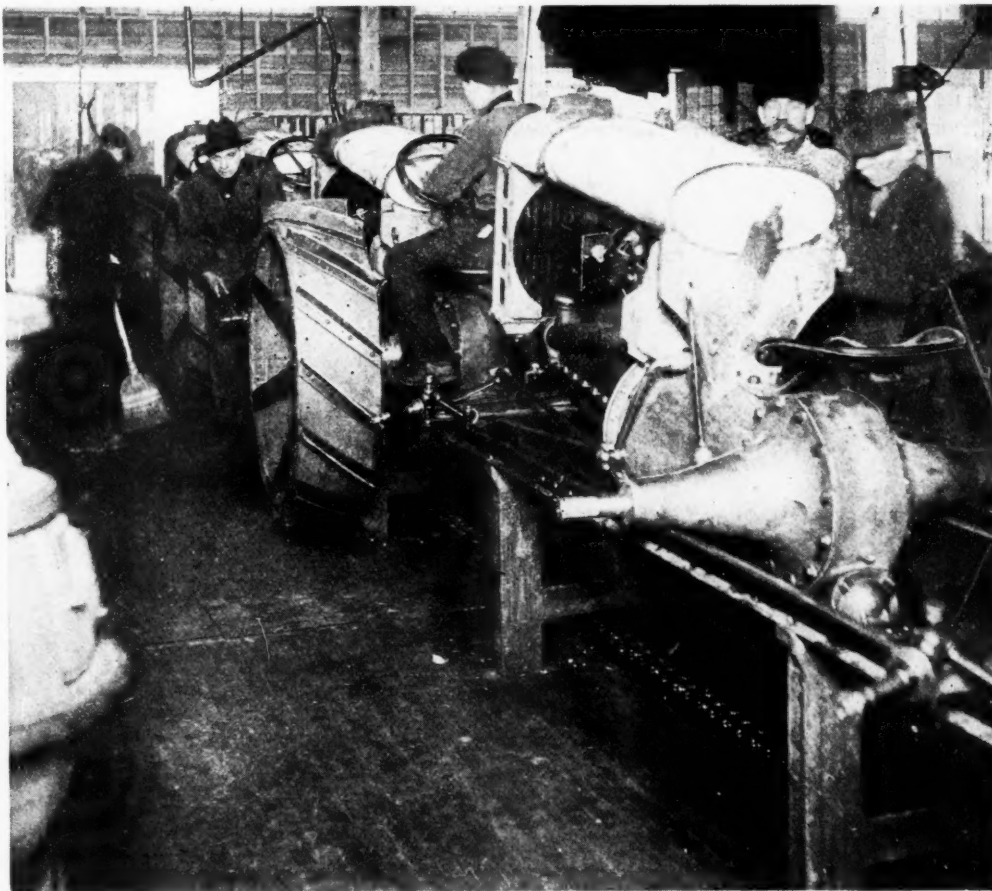
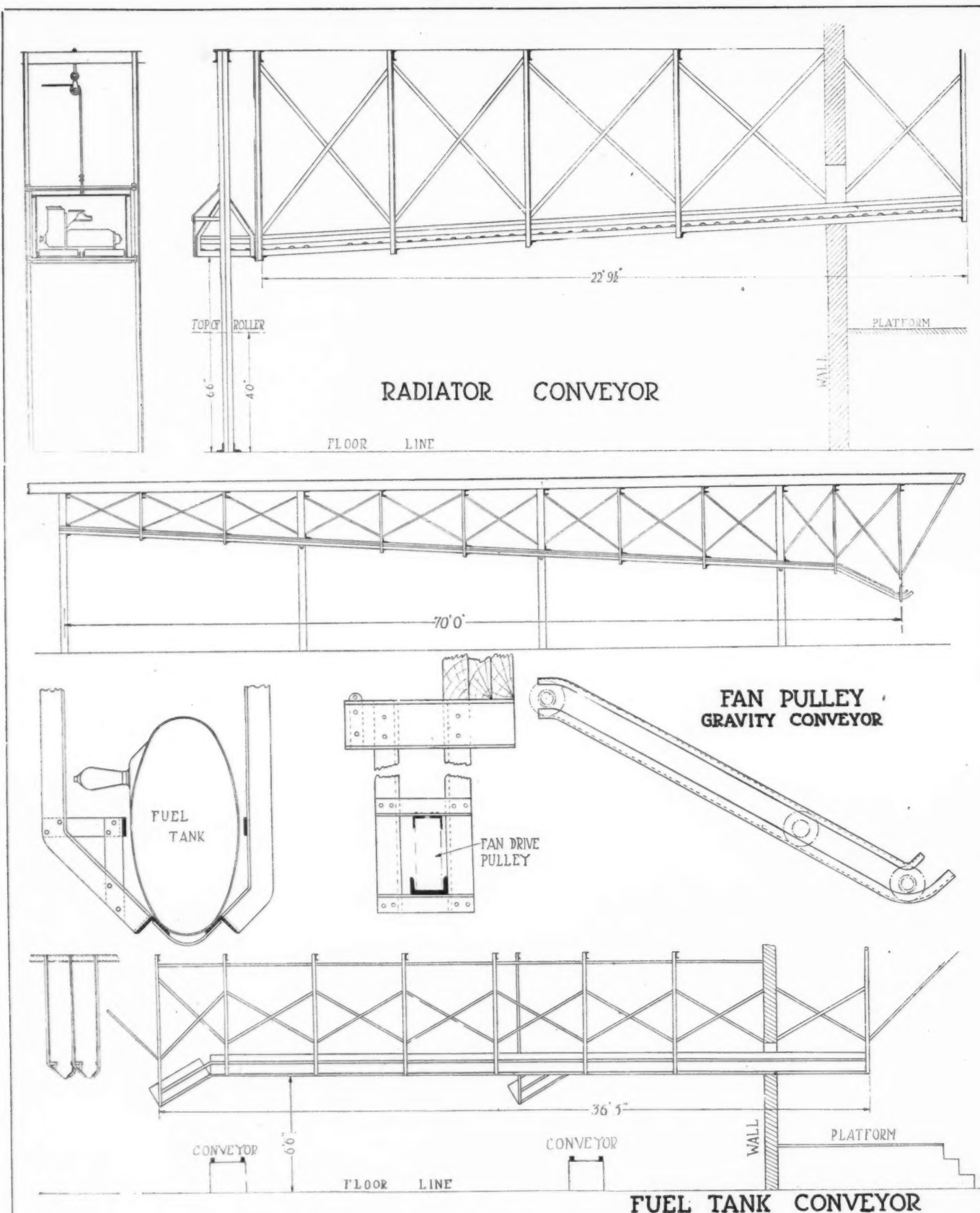


Fig. 21—The end of the tractor assembly chain, at which end the wheels and accessories are put on and oil, gasoline and water put in place so that the tractor can be started. In the background is seen a tractor with its wheels in position



Overhead Conveyors Used in Assembling the Fordson Tractor

The upper one for the radiator is of the gravity roller type and is provided with a counter-balanced elevator at the end, which automatically drops the part to a convenient height for the workman. On removing the radiator the elevator returns for the next one.

Small circular parts such as the fan pulley are rolled between two sloping channel irons, extending from the machine shop to the assembly department.

The fuel tanks are supplied from outside the building. They slide on two angle irons with guide strips at the side.



Fig. 22—Left—Tractors at the end of the assembly row. Here they are ready to be started. At the left of the illustration is shown the machine for doing it. This is a swinging electrical cranking machine which fits over the starting crank handle. Fig. 23—Right—Electric cranker in position turning over engine while it is receiving water

left of the illustration may be seen one of the men with the coil box ready to bring it to the proper position. The stationary stand at the end of the complete tractor assembly track is slightly higher than the track itself, so that when the flanges are bolted together and the preliminary operations on the stationary rack are completed, it is only necessary to push the tractor down the slope, where it is carried on rails to the track, which

picks it up and starts it along for the next operation.

The commencement of this journey is shown in Fig. 20, where a view is given down the line of assembly. The doors seen in the background show where the tractors are finished. The foreground shows the first steps along the moving chain. The radiators are put on, the coil boxes in place, fans, steering gears, control mechanism, tank, steering wheel, etc., go on step

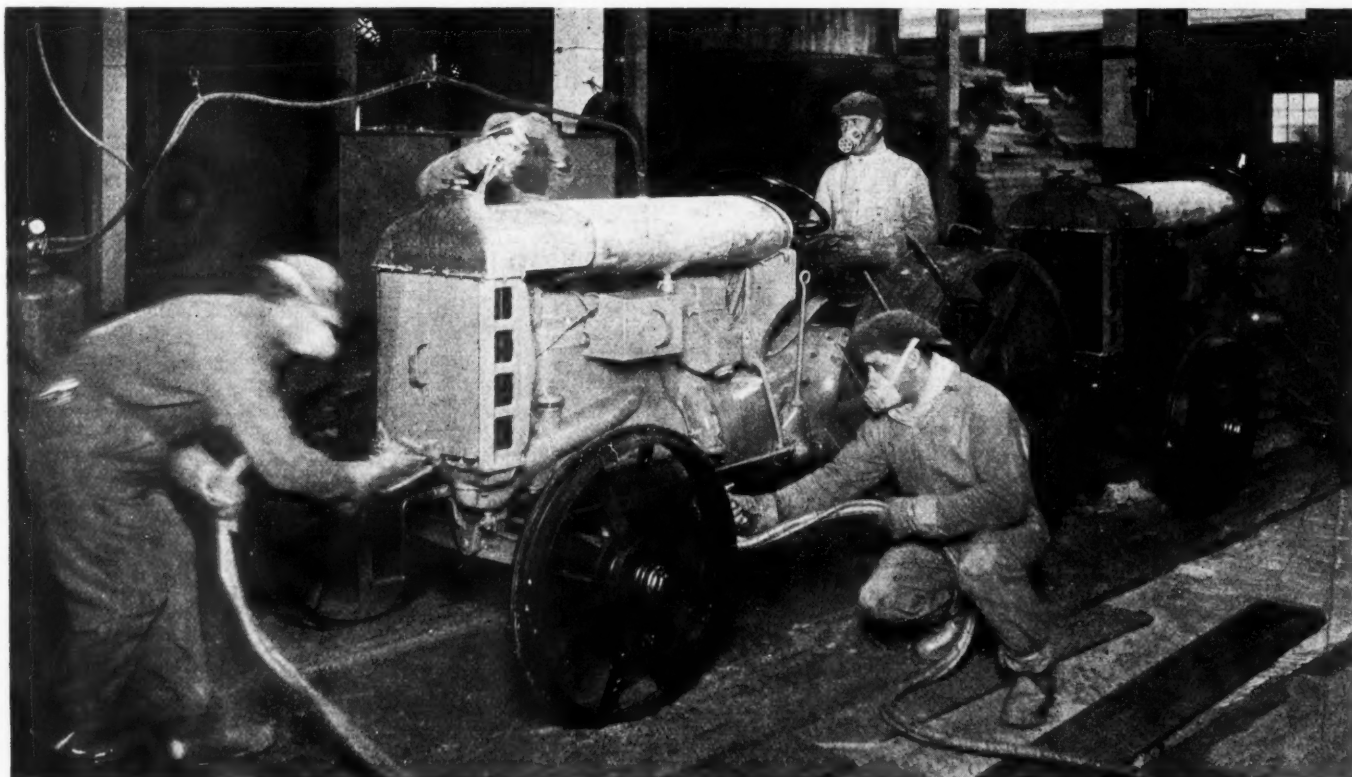


Fig. 25—Tractor in the paint shop being spray-painted by a gang of men wearing gas masks. It takes 2 min. to spray a tractor, and there are two gangs at work

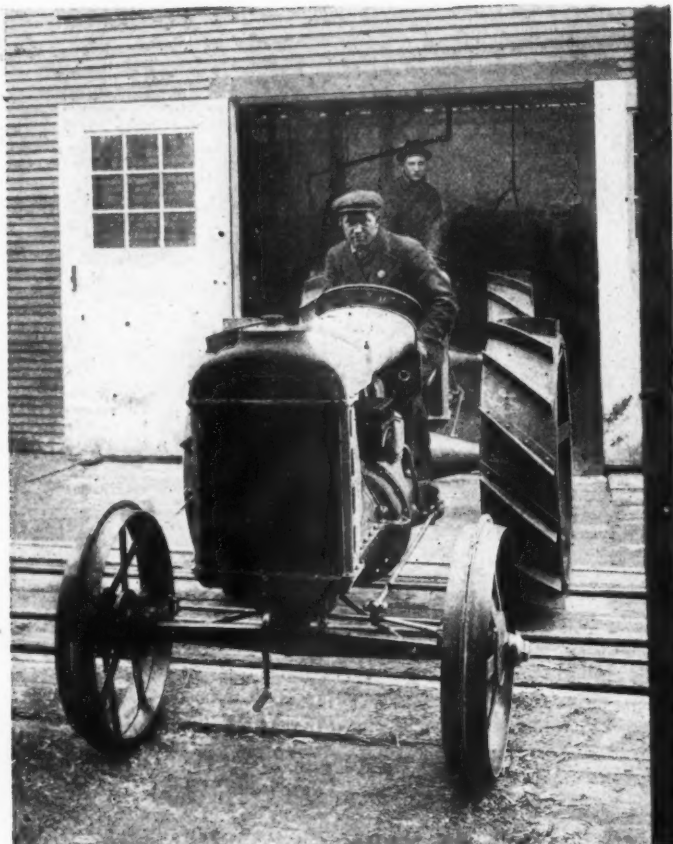


Fig. 24—The finished tractor being driven out of assembly building across a small alley into the paint shop

by step, and the materials are stored always at a point along the chain where they will be required for assembly. Eventually the wheels which go on the tractor will be fed from underground and come up on an elevating conveyor which will bring them directly to the right place. At the present time, as a temporary arrangement, they are rolled in, but this will not last much longer.

Fig. 21 shows the tractor ready for its wheels, and, in the background, a tractor which has its wheels already in position. Here the wheels are bolted tight, the accessories all mounted in position, the radiators filled with water and sufficient gasoline is put in the tank for an ordinary running which the tractors receive immediately after they leave the assembly chain. Fig. 23 shows the tractor immediately after it has left the end of the assembly chain. It is now ready to start, and the device shown at the left of the illustration incorporates a very ingenious method of cranking the engine. This is a beamed-shaped construction with a starting crank, as illustrated. It is swung into the tractor as shown in Fig. 22, and the electric motor started, whereupon the tractor engine is cranked vigorously until firing begins. Timing several of these showed that it required an average of 15 to 18 sec. to start a tractor. As soon as the tractor engine is started a driver-inspector steps into the seat and drives the tractor out of the assembly shop door, as shown in Fig. 24, where it passes across a narrow alley into the paintshop.

The painting is done by two gangs of four men each. These men are equipped with gas masks, and it requires 2 min. for a gang of men to paint a tractor. As soon as the tractors are painted they are driven away.

Wartime Investigations in Wood and Glue

UNDER the stress of war and the necessity of furnishing aircraft to the fighting front in large numbers and in a short time, it was found necessary to supplement the information available on wood and glue by extensive additional research work on these two important construction materials. It was found in many instances that factories taking Government contracts for aircraft and wagon work had in their desire to help neglected to go into the situation thoroughly and found themselves unable to produce on schedule. The rigid Government inspection showed them that their equipment was inadequate to meet the special demands placed upon it, and their knowledge of the peculiarities of the material was not sufficiently exact.

Many varied difficulties were encountered. Vehicle manufacturers had trouble drying stock. Lumber for wagons to be used in the hot, sandy sections required more thorough drying treatment than lumber for wagons to be used in more moist districts, and it was necessary to dry heavy stock quickly. Propeller manufacturers found that making propellers involved a great many more variables than the mere gluing of laminations and shaping the block—internal stresses occurred that caused warping and open joints in seemingly perfect blocks. Though they had been using glues for many years, they soon discovered that there was a wide difference between high-grade laminated work and the class of work ordinarily accepted as commercial standard. It is not surprising that the panel manufacturers making aircraft plywood for the various governments had some little difficulty at first in meeting aircraft specifications.

While waterproof glues have been in existence for some years, they were not well known and little information was at hand as to the correct procedure for their successful use. During the war the Forest Products Laboratory of the U. S. Forest Service at Madison, Wis., has been working on problems that seemed to give trouble to the plants engaged on war

contracts. Much help has been given manufacturers, and a large staff of specialists has been engaged in obtaining information and developing new ideas in the uses of glues and wood.

Automobile Standardization in Great Britain

FOR some years there has been a somewhat ambiguous position with respect to automobile standardization in Great Britain. The Institution of Automobile Engineers no doubt wished to emulate our S. A. E. and take charge of this work, but inasmuch as there is an Engineering Standards Committee in Great Britain which is in control of all standardization in connection with mechanical engineering, this was out of the question. An agreement has now been reached between the Institution of Automobile Engineers, the Society of Motor Manufacturers and Traders and the Association of British Motor and Allied Manufacturers, in regard to the future handling of all technical matters connected with the automobile industry and the relations between the industry and the British Engineering Standards Association.

In 1917 the Technical Committee of the Motor Industries was founded by the Institution of Automobile Engineers and the Society of Motor Manufacturers and Traders as an administrative body to consider matters in connection with standardization, research, etc., and to co-ordinate investigation in connection therewith. By the arrangement just come to this committee will be disbanded, and the functions exercised by it will in future be carried out by a Technical Committee appointed by the Association of British Motor and Allied Manufacturers. The latter body was formed to look after the commercial interests of the British automobile building firms, and it has agreed to conditions which will insure that the technical qualifications of that committee shall be properly safeguarded.



The F O R U M



Advantages of Steam

By Sewall Morse

IN the March 20 issue of AUTOMOTIVE INDUSTRIES Dr. C. P. Schwarz wrote interestingly of the possibilities of steam power from a thermal standpoint. When competition began between the steam engine and the internal combustion engine for supremacy in motor vehicle use, it was claimed that the "gasoline engine" was much the simpler and simpler to operate, besides being far more economical of fuel. Manufacturers of automobiles propelled by gasoline engines, taking advantage of the ignorance of the public in relation to these engines, pointed to the numerous undesirable features of the early steam automobiles and then triumphantly pointed to the new power which was soon to make steam power a matter of history, and announced that "all you have to do is to turn the crank and go." Eventually the manufacturers of steam cars, with one exception, gave up the game. This exception was slow to improve, but to-day it is not only demonstrating, I am informed, that a steam-propelled car can accomplish as much with 1 gal. of kerosene as the average gas car of equal weight does with 1 gal. of gasoline, but is cheaper in maintenance, has few troubles, is mechanically simpler than the gas car, is safer in emergencies and simpler to control.

There is not a low-priced steam car in the market, yet such a car offers no serious problems in its conception. The writer has been informed by men who know the market that there is a big waiting demand for a low-priced steam car, and a salesman of gas cars was recently heard to say that he believed a steam car at \$1,000 or less would be the best selling proposition in the pleasure car field to-day. The important advantages of steam power for the propulsion of trucks and tractors are known to all mechanical engineers, and the use of coke, coal or crude oil for fuel is possible. With simplicity, reliability, durability and fuel cost in its favor, does it not seem that motor vehicle manufacturers and others who have the necessary capital are blind to the possibilities offered by steam in the motor-vehicle field?

From a thermal standpoint there are possibilities, both in steam generation and use, that can be utilized, and by means practical for motor vehicle use, that will result in thermal efficiencies at least equal to that of the best automobile gas engines now in use. This statement is made as a result of long study of the many problems relative to the economic generation and use of steam in small power plants and the designing of means for its accomplishment.

Ideal efficiency in the steam engine is first limited by the temperature of the steam that it is practical to use. While this limit is to be regulated for the use for which the outfit is intended, there is positive assurance that an astonishing efficiency can be obtained from steam outfits of 100 hp. and less, that such outfits can be made practical, of low cost and adapted to the use of any liquid or solid fuel. The limit of efficiency, where the highest efficiency is essential, as in aviation uses, would seem to be dependent upon a steam temperature that would permit of cylinder lubrication. However, suitably designed steam engines have been continuously operated with steam at from 800 deg. to over 900 deg. Fahr., and for short periods at higher temperatures, with no resultant injury whatsoever to pistons or cylinders; and it is not unlikely that an engine can be designed that can be successfully operated with steam at any temperature that it is practical to produce. That steam power can be made practical for aerial uses the writer has not a doubt, and that a steam-power plant can be produced that will approximate the light weight and the high efficiency of recent aviation engines there are good grounds for assuming. The possibility of light weight and high efficiency with steam power, with its better condition for reliability and safety, seems to merit greater attention in aviation circles than has, apparently, been given it.

With steam at extreme temperature it must be anticipated that valves will, after a time, score and leak, but a steam engine will operate with leaking valves, although at lower efficiency, and leaking valves can be repaired or replaced; but for motor vehicle use steam of high pressure and a practical superheat can be used with perfect satisfaction, and, with kerosene or crude oil for fuel, with a resultant general economy, combined with reliability, mechanical simplicity and simplicity of control. There are reasons to doubt that this can ever be accomplished with the internal combustion engine.

Cooling Fan Problems

By Louis Schwitzer

President, Automotive Parts Co.

REFERRING to Mr. Hoyt's article on Radiator Cooling Fans, his statements with regard to end thrust are incorrect and the charts showing the amount of it are misleading. Mr. Hoyt states that a fan running in free air will produce a certain end thrust, but when this fan is placed back of a radiator the end thrust is increased about 25 per cent, depending on the restriction of the air passage. It is an established fact and a physical law that the pressure exerted by a moving air column, the end thrust, is a direct function of the air velocity. In other words with the increase of air velocity, the pressure or the end thrust increases. If a fan is placed behind a radiator the air velocity produced by the fan is considerably less than in free air, on account of the restriction. If Mr. Hoyt's contentions are correct, then if the intake were restricted to such an extent that no air could be delivered the thrust load would be infinitely larger. This is absurd.

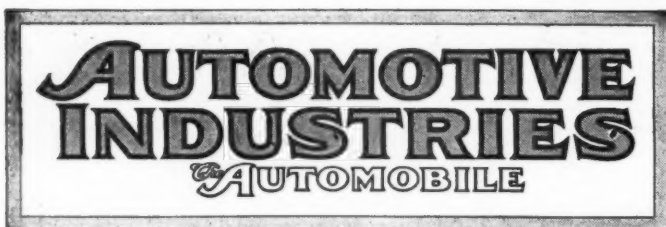
The charts in Figs. 5, 6, 7 and 8 also show that the end thrust drops faster than the air velocities; in other words, by restricting the inlet the thrust load will be diminished faster than the air velocity. All the curves in Figs. 5, 6, 7 and 8 show thrust loads of fans moving in free air. The manufacturer is interested only to know what thrust loads are produced in a fan behind a radiator, and not in free air or in a wind tunnel.

From actual tests and measurements on nearly 400 different makes of passenger cars, trucks and tractors, the writer has found that on about 80 per cent of these the maximum average air velocities obtained through the radiator are below 1500 feet per minute; on about 17 per cent the velocity is between 1500 to 1900 feet per minute and on only 3 per cent it is above 2000 feet per minute. The highest ever found was 2200 feet per minute. These are the air velocities which must be taken into consideration in determining the thrust loads in radiator fans under actual operating conditions.

It will be found from Mr. Hoyt's chart Fig. 5 that on a 16 in. fan, considering even the maximum obtainable average air velocity of 2000 feet, the thrust load will be not more than 3 pounds. On an 18 in. fan as per Mr. Hoyt's chart, Fig. 6, it will be about 3 1/4 pounds. For 20 in. and 22 in. fans (Figs. 7 and 8) Mr. Hoyt does not show air velocities as low as the maximum actually obtained with these sizes of fans on automotive vehicles. In Fig. 8 the velocity and end thrust curves start with 2600 feet per minute and a corresponding end thrust of about 6.8 pounds. I do not believe a single truck or tractor can be found where air velocities of 2700 feet per minute through the radiator can be measured. In passenger cars, where this or higher air velocities through the radiator can be produced, it is done at high vehicle speed only. At these speeds, however, the initial air velocities produced by the motion of the vehicle tend to drive the fan and balance the end thrust produced by the fan itself.

In any event, it is shown by charts (Figs. 5, 6, 7, 8) that the thrust loads in radiator fans for the air velocities actu-

(Continued on page 983)



PUBLISHED WEEKLY
Copyright 1919 by the Class Journal Co.

Vol. XL.

Thursday, May 1, 1919

No. 18

THE CLASS JOURNAL COMPANY

Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
U. P. C. Building, 239 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL
David Beecroft, Directing Editor
P. M. Heldt Sydney Oxberry
DETROIT OFFICE WASHINGTON OFFICE
J. Edward Schipper Allen Sinsheimer

BRANCH OFFICES
Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
Detroit—95 Fort Street, West, Phone Main 1351
Cleveland—Guardian Bldg., Phone Main 1142
Philadelphia—Widener Bldg., Phone Walnut 5601

Cable Address Autoland, New York
Long Distance Telephone 8760 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico One Year, \$3.00
Canada One Year, 5.00
Foreign Countries One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

HORSELESS AGE SUBSCRIBERS
Subscriptions for the Horseless Age transferred to the subscription list of AUTOMOTIVE INDUSTRIES in the merging of the two publications will be completed in full by the weekly issues of AUTOMOTIVE INDUSTRIES to the dates of expiration shown on the records of the Horseless Age Co.

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), Jan., 1907.

Intelligent Governmental Co-operation Needed

THE welfare of American industry should be the chief consideration of the next Congress. The world struggle for commercial supremacy now beginning will be won by that country which extends the most complete and most intelligent governmental co-operation to its manufacturers. This means that Congress must consider every form of governmental aid, financial, legislative, practical and direct, for American industry. It means, if America is going to win, or even hold her own in the great commercial conflict, that there must be a complete removal of the present obstacles thrown in the path of industry by ancient governmental systems.

An automobile manufacturer recently inquired of a government department for important information. The department had about 75 per cent of the data needed. To send them incomplete was useless. To secure the remainder meant an expenditure of a small amount of money. To get approval for

the expenditures required 40 days. When the manufacturer was finally given the information it had ceased to be of value.

The fault in this and other similar cases lies in a system which was designed to insure wise and proper expenditures of great sums for battleships and the like, but which, in its inflexibility, reacts harmfully in its application to minor matters.

If governmental departments are to be of benefit to American industry it will be necessary for them to be as keenly awake, energetic, efficient and flexible as American industry itself, else we shall have the equivalent of a huge organization with one-half operating on a modern quantity production basis and the other stifled by antiquated methods.

Employers' Industrial Commission

IN last week's AUTOMOTIVE INDUSTRIES was published a report of the commission which was appointed by the U. S. Department of Labor and sent abroad by the Government to study the British labor conditions. This commission was composed of employers of labor and this report is worthy of careful study by manufacturers in this country. That study should be considered with the article on labor conditions in Great Britain which appeared in the April 17 number so that the commission's findings can be read in the light of the differences between the position in Great Britain and in this country.

Perhaps the most important and interesting fact in connection with this commission's report lies in the appointment of such a committee by the Government as an evidence of the importance of such a study for the benefit of all parties in this country. As far as we have been able to find out, it is the first time in the history of the United States that a commission of employers has been appointed by the Government to study labor conditions in a foreign country, and this method of attempting to arrive at the meat of the situation promises well for future Governmental activities.

We would call special attention to the statement of the commission that the British worker thinks in terms of class rather than individually and tends more toward organization than in this country. The importance of this item in connection with the machinery for the settlement of labor disputes was indicated in AUTOMOTIVE INDUSTRIES of April 17.

It is also worth while to note the definition of capital and labor as found by the commission, which is very different from the customary interpretation in this country. It will be noted that "capital" includes only the stockholder, or the invested capital, and that the term "worker" includes everyone contributing to the actual management, emphasis being placed on the fact that labor includes both brain workers and manual workers.

Altogether the report is worth consideration, particularly as the traditions in Great Britain will be quoted a good deal in this country in the discussions which take place on our conditions.

Fundamentals in Foreign Trade

WHEN one of the speakers at the Foreign Trade Convention last week emphasized that "There is more than profit in foreign trade," he set in vibration a thread of thought that was instantly appreciated, and one that plays a more forceful rôle in foreign trade than is generally acknowledged, namely, that in foreign trade it is just as essential to have regard for the countries you are doing business with as for your own selfish ends.

This sentiment found expression with another speaker recently returned from an investigation through Europe who expressed his deepest thought in the words, "Getting cash against documents at seaport is not the best method of building up foreign trade."

Other speakers expressed this in a variety of ways. It found outlet in one session by the statement that American concerns must be prepared to extend credits much in advance of what they have done in the past and perhaps to a large extent substitute such for the cash-against-document practice followed now. They must be prepared to buy foreign securities, particularly from European allies.

The initial step toward greater extension of credit was expressed in the exhortations of many that officers of our companies and executive heads make extended trips to study new markets. This is essential. Heretofore too many firms have engaged mere hirelings to establish business in Latin-American countries merely because they were familiar with Spanish or had made a trip or so for other lines of industry.

Such is not the fundamental way to establish foreign trade. Such men too often shift from concern to concern and from industry to industry to be of value as representatives in establishing foreign connections. If the head man of the concern will make the investigation, will meet face to face the men he is to do business with, will investigate the standard of business morals, will look into the credit systems of foreign countries, will study the characteristics of the people and will bring back to the Board of Directors a complete picture of the foreign field, then will the reasons for greater extension of credit to such rational limits as 90 or 120 days be better understood and then will it be better appreciated why cash-against-document at seaport is not the surest way to foreign trade success.

There is too wide a gap between the foreign buyer and the American manufacturer. One has not met the other in his home town. One does not clearly enough realize the difficulties of the other. Neither realizes the complete nature of the relationship that exists between them. Neither writes just as good a business letter as he would if they were better acquainted.

The foreign buyer and the American manufacturer are literally oceans apart in their conceptions of service. The foreign buyer has problems that the manufacturer may have heard of but does not comprehend. He does not think intelligently about them. Many makers would never have so persistently insisted on not fitting magnetos to their cars for certain parts of foreign trade if they had known the field.

Many manufacturers would have realized how super-important it is to give more careful attention to crating goods for Latin-American countries than for European countries, solely because those republics are not so uniformly fitted with transportation systems as the old cities of Europe. Frequently, crating that will do for one South American country will not do for another because the transportation systems are fundamentally different. One size of crate is satisfactory on the east coast but may be impossible on the west coast and neither may do for inland points where some of the system of transportation may be by horse-back.

Many manufacturers fail to realize that the service question in one part of a South American country can be satisfied in one way, but quite a different policy must be followed in other sections. A case in question is Argentina. The larger cities have service stations and service capacity, but several hundred miles back in the country the thought of service does not exist. The facilities for it are not there. This calls for differences in equipment, as some parts of equipment demand much more service than others.

A better acquaintanceship between manufacturer and foreign merchandiser and foreign consumer is the open sesame to increased foreign trade and more permanent foreign trade. This acquaintanceship must be through the board of directors of the manufacturers. A hireling will not do. The very spirit of manufacture must be instilled into the director who makes the foreign investigation, and he in turn must bring back to his company the spirit of the foreign people, the spirit of their business fabric and a visualization of their complete business structure.

□ Latest News of the

Better Co-operation Urgent Need for Greater Commercial Development

U. S. Chamber of Commerce Meeting Urges Revision of Laws to Fit New Industrial Era—Points Out Necessity of Co-operative Regulatory Control—1100 Attend

By Allen Sinsheimer

ST. LOUIS, April 30.—Special Telegram.—Government, capital and labor must recognize that American industry is entering a new era in its history, and must completely revise laws, organizations and perspectives to accord with the new order.

There must be abolition of the antiquated laws that have failed to keep pace with the higher standards of industry.

There must be legal approval of co-operative industry, of associations of manufacturers or combinations not for price-fixing but for industrial progress, as, for example, with the Webb bill, which should be duplicated for domestic industry.

There must be less Government interference with business and more co-operative regulatory control. Railroads should return to their owners as quickly as Congress can pass legislation providing for Governmental control of rates and regulations.

The American marine must be sold to Americans and be distributed to provide bottoms for every section of the nation.

There must be recognition that a union of labor is as justifiable as a union of capital in the form of a corporation, and labor must be regarded under the new business ethics as a fellow servant with capital and not as a commercial commodity.

Must Develop Foreign Trade

Foreign trade must be developed as a vital factor to the health of our industry, and we should look for our export trade not to the Allies, who need their own raw materials and have not the cash to spare to buy from us, but to South America, the Orient and the European neutral countries. The Allies cannot buy abroad until they can first develop their exports and sell abroad.

These were the major points developed at the convention held here this week by the United States Chamber of Commerce, which was attended by 1100 delegates from every section of the country, and during which papers were read on practically every problem of industry.

That America must prepare to make huge investments abroad to stabilize exchange and trade; that the Government should pay interest on all payments of

war contracts that are unduly delayed; that a comprehensive road construction and maintenance policy should be formed at once; that price fixing by the Government should cease in favor of the law of supply and demand; that the Federal Trade Commission should be a purely advisory body and end its prosecutions of industry; that government should be made most economical by a budget and should select its executives and all employees with more regard to their capabilities to assist industry; and that the nation must be educated by all agricultural and industrial bodies to value and understand foreign trade, were among other important recommendations that came from the various discussions.

Good from Anti-Trust Laws

"Nothing is more certain," said Secretary of Commerce William C. Redfield, "than that there has been a great change for the better in the ethics of trade since the anti-trust laws came into being. Business has outgrown the laws intended to control it and in the future will be more co-operative than competitive. A new business standard has commenced, hardly formulated yet, but none the less really operative, whereby industry and commerce recognize three-fold obligations to the public, including the Government, to labor and to business itself.

"Trade associations to deal with common problems working for progress are essential to our business welfare."

The establishment of a Federal Highway Commission, federal appropriations for building and maintaining highways, continuation of the Federal Road Aid Act beyond 1921, and the expenditure of federal funds for highways of a permanent type only, are advocated in the resolutions presented by the highways committee of which F. A. Seiberling is chairman.

The railroads must be returned to their owners, stated Senator A. B. Cummins, but not until legislation providing for a permanent policy of control and regulation has been enacted by Congress. To return the roads now would be to endanger the entire financial structure of the nation. They form 8 per cent of the nation's wealth and if returned now to

be operated at existing high costs would be likely to work great harm.

Other addresses were made by Maurice Casenave, head of the French Commission; Joy Joyce Broderick, of the British Embassy, and Lieut. Constantini of the Italian Mission. They told of the financial and other material damage caused by the war and of the need for control of imports until domestic and export trade are established.

There are no discriminations against American products, stated all these speakers, as in favor of products from any other countries, except, possibly, from some colonies, and it is the desire of each of the Allied countries to resume foreign trade with us just as quickly as conditions allow.

Numerous other discussions on all subjects were held, including talks on Housing, Foreign Investment, Payment of War Contracts, Highways, Industrial Training, Industrial Production, Domestic Distribution and Retail Distribution. Numerous resolutions are being considered and will be voted on to-morrow.

S. A. E. Research Committee to Study Fuel

NEW YORK, April 25—A meeting of the Research Committee of the Society of Automotive Engineers was held at Society headquarters in this city yesterday. At the previous meeting, held at the Bureau of Standards in Washington on April 11, it was decided to combine the Committee on Fuel Research and the Committee on Research in General, under the name of the Research Committee.

From the meeting held yesterday, it appears that this Research Committee will concern itself, for the present at least, mainly with fuel problems. A preliminary or sub-committee was appointed, consisting of Samuel A. Miles, chairman; Dr. E. W. Dean of the Bureau of Mines; and Dr. H. C. Dickinson of the Bureau of Standards, with the object of interesting the different industries affected by the fuel problem.

Two Ballot Cars for Indianapolis Leave France

PARIS, May 1—(Special Cable)—Two Ballot cars for the Indianapolis race, accompanied by Wagner and Bablot, are leaving Havre by the *Espagne* on May 3.

W. F. Bradley, special correspondent of AUTOMOTIVE INDUSTRIES, has already cabled that the four Ballot cars left France on April 26. However, from information which has just reached AUTOMOTIVE INDUSTRIES from another source, it would appear that only two cars are actually on the way, the two now advised completing the Ballot team.

Automotive Industries

Industrial Principles In Treaty of Peace

Recommendations of Commission on International Labor Legislation Adopted by Supreme Allied Council

WASHINGTON, April 29—The State Department to-day announced that the nine clauses proposed by the Commission on International Labor Legislation had been adopted by the Supreme Allied Council for insertion in the Treaty of Peace.

The clauses proposed by the commission were somewhat amended, chiefly in phraseology, before being adopted. They now form a part of the Treaty of Peace and are in the nature of recommendations rather than being obligatory upon the nations. The principles thus endorsed by the Supreme Allied Council are the 8-hour day, a weekly day of rest, abolition of child labor, equality of pay for men and women for work of equal value, and "the right of association for all lawful purposes" of workmen and employers.

The text of the clauses incorporated in the Peace Treaty is given below. They were preceded by a preamble in which it is asserted that "the high contracting parties, recognizing that the well being, physical, moral and intellectual, of industrial wage earners is of supreme international importance, have framed a permanent machinery associated with that of the League of Nations to further this great end."

First—The guiding principle that labor should not be regarded merely as a commodity or article of commerce.

Second—The right of association for all lawful purposes by the employed, as well as by the employers.

Third—The payment of the employed of a wage adequate to maintain a reasonable standard of life as this is understood in the time and country.

Fourth—The adoption of an eight-hour day or forty-eight-hour week as the standard to be aimed at where it has not already been obtained.

Fifth—The adoption of a weekly rest of at least twenty-four hours, which should include Sunday whenever practicable.

Sixth—The abolition of child labor and the imposition of such limitations on the labor of young persons as shall permit the continuation of their education and assure their proper physical development.

Seventh—The principle that men and women should receive equal remuneration for work of equal value.

Eighth—The standard set by law in each country with respect to the condition of labor should have due regard to the equitable economic treatment of all workers lawfully resident therein.

Ninth—Each State should make provision for a system of inspection, in which women should take part, in order to insure the enforcement of the laws and regulations for the protection of the employed.

Without claiming that these methods and principles are either complete or final the high contracting parties are of opinion that they are well fitted to guide the policy of the League of Nations, and that if adopted by the

industrial communities who are members of the League and safeguarded in practice by an adequate system of such inspection, they will confer lasting benefits upon the wage earners of the world.

The conclusions of the Commission on International Labor Legislation were drawn up in two parts for presentation to the Supreme Allied Council. The first part was a convention providing for the establishment of a permanent World Labor Conference in association with the League of Nations, the second part was made up of a declaration of principles regarding the rights of workers throughout the world which were suggested for inclusion in the Treaty of Peace and, as mentioned above, were so included in somewhat amended form.

To Meet Annually

A meeting of the Labor Conference is to be held annually, and it is recommended that the first meeting be held at Washington next October.

In the permanent organization, the Commission recommended that there be two distinct parts: The International Labor Conference; and the International Labor Office controlled by a governing board.

The International Labor Office will be located at the seat of the League of Nations and will be a part of its administrative organization. The governing body controlling it will comprise 24 members, 12 of whom will be representative of governments, six elected by a conference of employers and six by a similar conference of workers.

Car Imports to France Permitted with 45% Duty

PARIS, April 19—Automobile imports into France, which were prohibited by official decree, April 1, 1917, will be admitted on a 45 per cent duty within a very short time, according to information received from very reliable quarters. This duty is a temporary measure and will remain in force for 18 months only. At the end of this time the custom tariffs will be revised. The 45 per cent figure is only looked upon as a war measure to enable French manufacturers to get into production.

Only a short time ago it was believed that the French would adopt a 45 per

cent duty against America and a lower duty in favor of other countries. This idea, which was mooted by the automobile manufacturers and presented at the meeting of the Inter-Allied Automobile Association, has evidently been abandoned as impracticable.

Standard Landing Field Specifications

WASHINGTON, April 30—Major General Charles T. Menoher, Director of Air Service, has prepared complete specifications for standardized landing fields. It is planned to make these public at the Southeastern Aeronautical Congress which will be held at Macon, Ga., May 2 to 10. The Congress has been arranged through the co-operation of 9 southern states and some 243 commercial organizations covering the South.

Reservations for Summer S. A. E. Meeting

NEW YORK, April 30—Reservations for the Summer Meeting of the Society of Automotive Engineers, which is to be held at the Hotel Ottawa and cottages, Ottawa Beach, Mich., June 23-27, are coming in at a rapid rate. All reservations are to be handled entirely through the S. A. E. office in New York. Accommodations are entirely on the American plan. Following are the rates, for four days of the meeting, namely, June 23, 24, 25 and 26:

| | |
|---|---------|
| Per person (2 or more in one room, without private bath)..... | \$28.00 |
| Per person (2 or more in one room with private bath) | *36.00 |
| Children under five years (in room with parents) | 12.00 |
| Children under ten years (in room with parents) | 16.00 |

*This rate applies in case of occupants of rooms containing or immediately adjoining private bath.

Ottawa Beach is about 30 miles from Grand Rapids, Mich., on the east shore of Lake Michigan. It can be reached direct by boat to Holland (from Chicago) on the Pere Marquette Railroad, to Holland, or by Michigan Central, Pere Marquette, Grand Trunk or Grand Rapids and Indiana Railroad to Grand Rapids, and thence by electric through Holland to Macatawa.

The meeting proper will open on Monday evening, June 23, with a business session. This will be preceded by a meeting of the Standards Committee at 10 a. m. Monday.

Provides State Tractor Tests

OMAHA, April 29—Two bills passed by the session of the Nebraska legislature just closed have an important bearing upon trade in passenger cars, trucks and tractors in this state. It is believed that the general effect will be a tendency

to concentrate the trade in the larger cities of the state.

House Bill No. 85 provides that no tractor shall be sold in Nebraska until a sample machine has been tested by three competent engineers of the state university at Lincoln, who shall report to the state railway commission. The commission will compare this report with the specifications and claims of the manufacturer or agent as set forth in advertisements or sales arguments, and shall deny permit for sale if these specifications or claims shall be found false.

The ruling of the commission shall apply only to the particular make of machine under consideration, and not to the whole or other product of a company which manufactures other machines, which do meet specifications and claims.

The commission is also given power to deny sales permits for any tractor on complaint of any two bona fide customers, properly substantiated, that an adequate service station, with full supply of parts, is not maintained within the state. The law becomes effective July 15.

The second bill, Senate File No. 86, declares the sale, trade or disposition of any automobile or tractor void unless the necessary supplies and repairs are carried at some point within the state, being very similar to the first measure. It differs in voiding the sale after consummation as against forbidding sale beforehand. This law is effective July 18.

Tax Not Required on Original Equipment

NEW YORK, April 30—It is not likely that the manufacturer of tires, tubes, parts and accessories will be required to pay a tax on these products under the new War Revenue Bill, when they are supplied to car or truck manufacturers as original equipment. The War Revenue Bureau has not issued any formal rulings as yet, but this is the interpretation placed on the measure by the National Automobile Chamber of Commerce. Manufacturers of such products who supply tires, tubes, parts or accessories to manufacturers of vehicles for paid replacements or repairs, however, will be required to pay a tax.

It is suggested that parts and accessory makers bill the car and truck manufacturers with tires, parts and accessories at the regular price, with a notation on the bill that the 5 per cent War Tax may be added later if the Government so orders. Commissioner Roper has ruled in a letter to a member of the National Automobile Chamber of Commerce that when a part on which a tax has been paid is returned for credit, the amount of the tax may be deducted from the next tax return.

Tone New President of Carborundum

NIAGARA FALLS, April 30—Frank J. Tone has been made president of the Carborundum Co., succeeding the late Frank W. Haskell. George R. Rayner is vice-president, succeeding R. B. Mellon, Pittsburgh. F. H. Manley retains the office of treasurer.

Detroit Union Workers Demand 44-Hr. Week

Formal Demonstration to Claim Wage Increase—Growth of Organized Labor

DETROIT, April 29—On May 1, organized labor in Detroit will wait upon employers with a demand for shorter working hours and increased wages. On the same day a mass meeting will be held at the Arena, where Arturo Giovannitti of New York City, and James H. Fisher of Butte, Montana, both affiliated with the International Workers of the World, will speak. A demand will be made for the release of all workers convicted and imprisoned for labor activities. A number of unions will march from their halls to the scene of the meeting but no general parade will be held.

The general demand will be for a 44-hour week and the adoption of new wage rates, embodying increases from 10 to 25 per cent. Whether there will be a general demonstration is not known. It is said a majority of the unions will participate, and, if that is so, approximately 90,000 workers will be involved. Detroit Federation of Labor officials declare Detroit is now 60 per cent organized, and thousands are joining the movement weekly.

The Typographical Union and the Electrical workers will walk out on that date, it is said, unless demands now before employers are granted. The printers want \$42 a week minimum, and a 42-hr. week. The Electrical Workers want a \$40 minimum wage and a 40-hr. week. Foundry workers are already on strike in 13 plants. The United Automobile, Aircraft & Vehicle Workers of America called a strike recently at the Wadsworth Mfg. Co., builder of Ford sedan bodies, and approximately 2,000 men are out.

It is said that unless this strike is adjusted quickly, and the rights of the men to a voice in the determination of the conditions of employment upheld, the strike will spread to 25,000 automobile workers. This union, which is now 22,000 strong, is considering calling a general strike. The Wadsworth company is now paying a minimum wage of \$6 daily but refuses to recognize the union or deal with the existing shop committee. Several discharged men must be reinstated before the men will return to work. The company is endeavoring to operate with strike-breakers, but is encountering great difficulty, and its production has been greatly curtailed.

The labor movement in Detroit has expanded 100 per cent in the last year. Over 56,000 new members have been taken into the ranks. The United Automobile, Aircraft & Vehicle Workers of America numbered 5,000 one year ago. The membership has now passed the 20,000 mark. Approximately 500 new members are being taken in every week. Machinists, who had one local with 1,

500 members last year, now have 4 locals with 10,000 members. Boiler-makers were not organized a year ago. They now have 6 locals and several thousand members. The building trades unions have doubled their membership. Twenty-five per cent of the skilled workers were organized a year ago. Now over 60 per cent are organized.

Curtiss Appoints Eleven Commercial Aircraft Distributors

NEW YORK, April 30—The Curtiss Aeroplane & Motor Corp. has entered upon the production of aircraft for commercial purposes and has so far completed its arrangements as to establish 11 distributors in the United States and several in foreign countries. Sales headquarters have been opened at 52 Vanderbilt avenue under the supervision of J. P. Davies, formerly an officer in the U. S. Air Service. Distribution will follow closely the plan of the Willys-Overland Co. with which the Curtiss company is affiliated. Following are the principal distributors and their territories:

American Trans-Oceanic Co., 505 Fifth avenue, New York—Greater New York, Long Island, Westchester County, Rockland County, Fairfield County, Conn.; Hunterdon, Somerset, Middlesex and Monmouth counties, N. J., and the State of Florida. P. L. Freeman is manager.

Curtiss Eastern Airplane Co., 130 South Fifteenth Street, Philadelphia—States of Pennsylvania, Maryland and Delaware, and Cumberland, Salem, Gloucester, Camden, Mercer and Burlington counties, N. J. G. Sumner Ireland, president and general manager.

Curtiss Southwest Airplane Co., 804 New Wright Bldg., Tulsa, Okla.—State of Oklahoma and northern counties in Texas. B. L. Brookins, general manager.

Curtiss Northwest Airplane Co., 701 Metropolitan Bank Bldg., Minneapolis—States of Minnesota, Montana, South Dakota and North Dakota. W. A. Kidder, general manager.

Curtiss Tri-State Airplane Co., 274 Shelby Street, Memphis—States of Tennessee and Arkansas and northern counties of Mississippi. W. S. Thompson, general manager.

Curtiss Humphreys Airplane Co., First National Bank Bldg., Denver—States of Wyoming, Colorado, Utah and New Mexico. I. B. Humphreys, general manager.

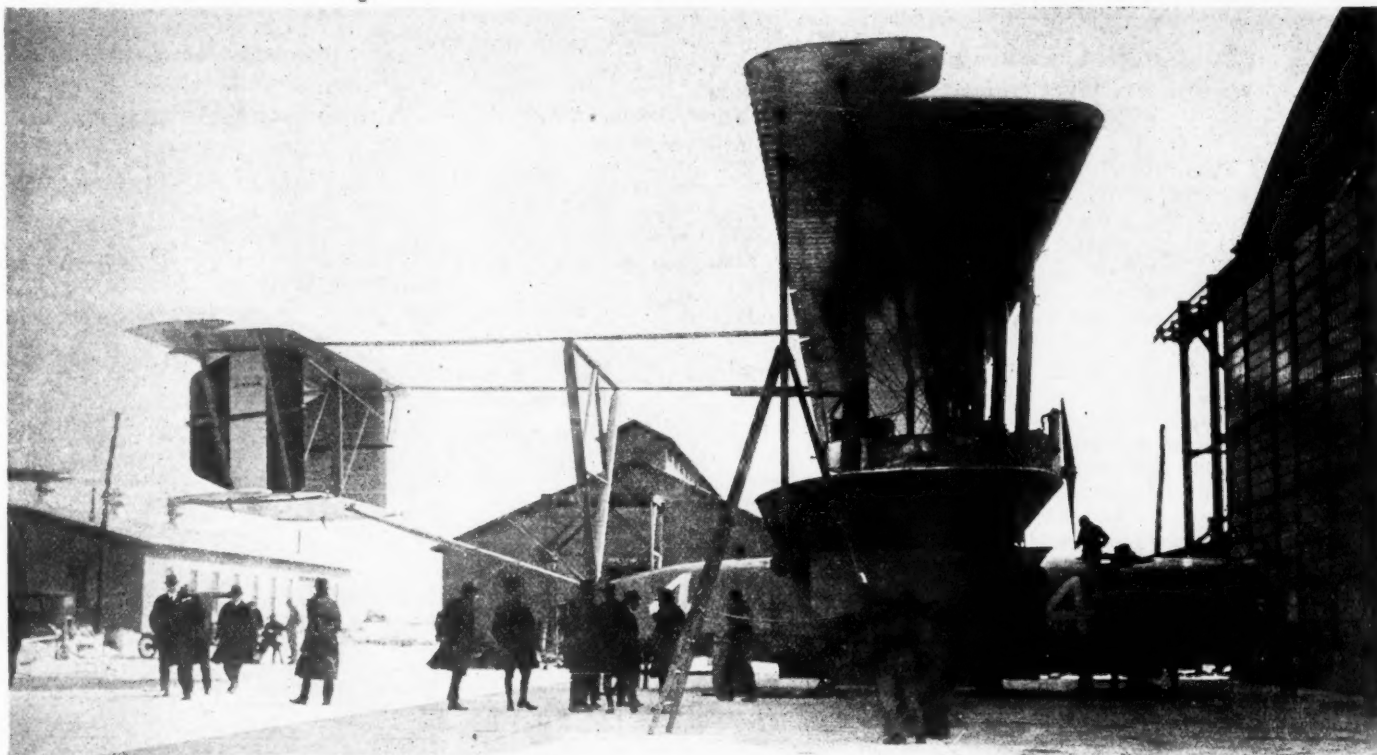
Curtiss Aircraft Co., Atlantic City, N. J.—Cape May, Atlantic and Ocean Counties, N. J. In addition to these, distributors have been appointed for Norway, Sweden, Finland and the Philippine Islands. George W. Browne, manager of the Overland agency in Milwaukee, and the Gibson Co., Overland dealer in Indianapolis, have been appointed local Curtiss dealers. A branch office has been opened in Chicago with George W. Browne as western representative.

The Curtiss company has adapted a number of its planes for commercial uses. Among these are the JN-4D-2 type which was used almost exclusively for training purposes by the American and Canadian governments; the MF flying boat; the HS-2L flying boat; the H-16-A flying boat; the 18-B land machine and a new three passenger plane which has been developed particularly for passenger service and which is styled "Oriole."

It is expected that within a short time a number of used machines of the JN type will be placed on the market at from \$2,000 to \$5,000. Prices of the other models have been set as follows:

| | |
|--------------------|----------|
| MF flying boat | \$10,000 |
| HS-2L flying boat | 25,000 |
| H-16A flying boat | 40,000 |
| 18-B land plane | 25,000 |
| Oriole, land plane | 7,500 |

Putting Final Touches on Navy's Transatlantic Fliers



THREE navy planes will be started at the same time from Newfoundland, probably within a week. They are the NC1, NC3 and NC4. The route will be from Rockaway Beach, L. I., N. Y., to Newfoundland by way of St. Johns, where a stop will be made, and from Newfoundland by way of the Azores, where a stop will be made, to Portugal. The three boats are identical, the principal dimensions being:

| | |
|-----------------------------------|--------------|
| Wing spread (upper)..... | 114 ft. |
| Wing spread (lower)..... | 126 ft. |
| Wing width..... | 12 ft. |
| Wing area..... | 2880 sq. ft. |
| Between wings..... | 14 ft. |
| Overall length..... | 68 ft. 3 in. |
| Hull length..... | 44 ft. 9 in. |
| Weight, empty..... | 15,100 lb. |
| Weight, fully loaded..... | 28,500 lb. |
| Gasoline capacity (10 tanks)..... | 1890 gal. |
| Speed..... | 79 knots |
| Power..... | 4 Libertys |

Adopt G. M. Savings Fund Plan

WILMINGTON, DEL., April 29—Stockholders of the General Motors Corp. met here to-day and voted to adopt the Savings and Investment Fund proposed for the benefit of employees. All directors were re-elected.

Briscoe to Design French Car of American Parts

DETROIT, April 29—Benjamin Briscoe, of the Briscoe Motor Corp., Jackson, Mich., has been elected a director of the Bellanger Frères, Paris, France, and will design a moderate priced automobile for the French company along French lines but of American parts to a large extent. He has opened an office in De-



troit, and has with him Rodolphe Stahl, an engineer who has been in his companies for nine years.

Briscoe is looking for a small factory to be used as a mechanical laboratory. The Bellanger Frères Co. was one of the smaller automobile companies of Paris before the war, but due to the fact that it was one of the companies selected by the French government for war work, it became one of the largest engineering works in France.

Mr. Briscoe has not severed his connections with the Briscoe Motor Corp.,

of which he is one of the principal stockholders, a director and a member of the executive committee.

New York Office for Willys

TOLEDO, April 29—Permanent offices of President John N. Willys of the Willys-Overland Co. have been opened at 1710 Vanderbilt-Concourse Building, New York. Mr. Willys expects to remain in New York most of the time directing the affairs of the Overland and allied companies.

Thousands of Unfilled Orders on Books

Demand for All Car Makes Ahead of Supply—Dealers Oversold—Used Car Problem

DETROIT, April 25—There is a tremendous shortage of automobiles in all sections of the country. While the factories are now making nearly as many cars per day as in former years and their production will be normal within 30 days, the unusual demand has swamped them.

The Ford Motor Co., owing to its production facilities and intensive merchandising system, is perhaps the best criterion of conditions everywhere. For the last 4 years this company has had approximately 100,000 unfilled orders on hand at all times. It is now getting into normal production again, and on April 24 it had 69,994 unfilled orders for immediate shipment. These orders are increasing daily in spite of the fact that the company is now running 2600 cars and will be producing 3000 cars daily within the course of the next 10 days.

The condition is almost similar with the Cadillac Motor Car Co., which has approximately 4500 unfilled orders on hand. The company is increasing production as fast as possible, but officials state that it will be several months before they will be able to catch up with the demand. The Cadillac company conducts its own sales and distribution work here. This station, which cares for the Detroit district only, is 100 orders behind and is selling its cars as fast as they are received.

The Paige-Detroit Motor Car Co., running approximately 70 cars a day, is unable to begin to supply the demand. If this company could double production tomorrow it would still take months to catch up.

The Hudson Motor Car Co. proposes to manufacture 20,000 Essex and 20,000 Hudson cars this year. It has 20 dealers who have sold their entire allotment for the year. The company is rushing work on its new Essex plant, and it is probable that both Hudson and Essex production will be materially increased if present conditions continue.

Willys-Overland Co., Toledo, has many distributors who have sold their entire allotment. The company is arranging now to get into production upon its new model, a light four, and it is planned to do this without curtailing in any way the production of its other lines. The company is now running approximately 600 cars a day, while its orders for machines are several thousand cars ahead.

While the Packard Motor Car Co. is just getting into production its dealers in every section are pressing for cars. Work at the plant is being pushed to the limit, but owing to the fact that the company has lost several months, due to the necessity of practically remodeling the entire plant to again handle peace

work, its production is bound to fall far below demand. This company makes 15 different body types and the demand is good for all.

The Hupp Motor Car Co.'s production schedule calls for 18,000 cars this year. The demand to date is practically 50 per cent greater than production. Sales officials say 30,000 Hupmobiles could be sold within the next 8 months if the factory was able to produce them. This year's production is 50 per cent greater than that of any previous year. The company has 2500 unfilled orders on its books to-day.

So great is the demand for Dodge cars that the company is now teaching its dealers to turn down orders gracefully without antagonizing the trade. The production system used by Dodge Brothers is rather unusual in that it fixes no set production for the year, aiming to produce just as many cars as possible. The company is now running between 500 and 550 cars daily, yet it is hopelessly behind in orders.

The Reo Motor Car Co., Lansing, has orders ahead for 4000 cars. Owing to the immense amount of work necessary to make the shift from war to peace, this company is not yet in full production. In certain departments a great deal of Government machinery is stored, and it will be some time before entire facilities will be available. The car shortage is very pronounced in every section, sales officials declare. The company is now running approximately 60 cars a day, but owing to its inability to reach capacity production at present, no annual production schedule has been made. The company has 1800 distributors, 90 per cent of whom have sold their quota for months.

The Used Car Problem

The used car is developing an unusual situation. Few people purchased any cars during the war. Fifty per cent of the car purchasers turn in their used cars as part payment for new ones. As a result the used car market is flooded. The demand for cars is so great, however, that buyers are snapping up every desirable machine, whether new or used. While this is the situation at present, it is already apparent that before the end of the year the average dealer is going to have a large stock of used cars on hand, and it is going to be necessary for him to specialize in the merchandising of used cars more than ever.

The factories are already coaching their distributors in used car merchandising methods, advocating new painting, some remodeling and, in many cases, custom-made bodies as a means of promoting sales. With present conditions existing, even cars of obsolete models are being quickly snapped up after being attractively fixed up.

New Ford Factory May Be in Cleveland

CLEVELAND, April 25—This city is petitioning Henry Ford to locate one of his proposed new automobile factories here. Petitions are in circulation, one enthusiastic booster alone securing 1300 names.

New Ford Officials Fill Vacancies

Ryan Succeeds Hawkins—Mayo Probable New Chief Engineer—Other Changes

DETROIT, April 26—New executives have taken hold of the important posts at the Ford Motor Co., to fill the positions of those who have lately resigned. In repairing the holes caused by resignation, the Ford company has taken men from within the organization.

Norval A. Hawkins, who was chief of sales almost from the time the Ford car was made, has been succeeded by William A. Ryan, his former assistant. Two years ago the Ford company abolished its retail sales department, and since that time has been merchandising its cars through a distributors' organization. Mr. Ryan has been in charge of building up this distribution and dealers' organization for several years, while Mr. Hawkins, who supervised the entire department in a general way, devoted most of his time to retail sales.

It was unofficially stated at the Ford plant that William B. Mayo, construction engineer, will succeed C. Harold Wills, former chief engineer, who resigned a few weeks ago. Mr. Mayo is at present directing all engineering work, assisted by M. M. Wibel, who has been connected with the engineering department for several years. Charles Morgana, Jr., who was in direct charge of the engineering department under Mr. Wills, resigned, and is now associated with his former chief in a new automobile project. Mr. Wibel was Mr. Morgana's assistant.

John R. Lee, who was in charge of the social, welfare, profit-sharing and bonus departments, has no successor as yet. C. A. Brownell, advertising manager, has assumed some of Mr. Lee's former duties, it is said. The rest of the work is being handled by his former assistants.

Mr. Wills states that he is going in business for himself. Owing to the personal friendship between Mr. Wills and Mr. Morgana, it is apparent that Mr. Morgana resigned wholly to join Mr. Wills in his new venture.

Trial of Ford Street Car

DETROIT, April 26—Henry Ford's proposed internal combustion engine street car will operate on a track the same as an ordinary street car. It will not be equipped with pneumatic tires but with steel flange wheels, and will have a carrying capacity as great as that of the present trolley.

If Dearborn township officials grant Henry Ford's application for a blanket franchise to operate a line in that township, the internal combustion street car, suggested as Detroit's solution for traction trouble, will be given a practical working demonstration. If the franchise

is granted work on the line will start within 6 months and cars will be in operation within 18 months. Three cars of the proposed internal combustion type are now under construction at the Fordson tractor plant at Dearborn.

Sale of War Vehicles in England

LONDON, April 10—Of the 80,000 trucks under the control of the War Department, 35,000 are American. A number of American trucks are in private use here, though sometimes the drivers are in khaki, presumably awaiting formal demobilization. At a sale at auction this week a number of trucks and motorcycles were disposed of. These were not war-used American vehicles, but a miscellaneous group which the American army had used here exclusively. The disposal of American war trucks from the front does not appear to have been decided on. Meanwhile there are frequent public sales of British war and transport trucks, and apparently there are thousands now lying idle here in various stages of repair. Some American cars, little more than junk, were recently auctioned, and surprisingly good prices were obtained.

The high prices ruling for used vehicles are reflected also in the tractor sales, Fordsons and Titans apparently commanding high prices, in some cases up to 75 per cent of their original cost. This fact merely indicates an unsatisfiable demand because of the closed market. Intrinsically many of these high priced used vehicles are overvalued now as when first sold.

British Truck Discount Rates Decided

LONDON, April 11—There has been much discussion in British trade circles, especially among the dealers, as to the rights of truck buyers to a discount from the manufacturers. With the progress of the trade and the growing demand for service facilities, which the truck manufacturer could not provide on the scale necessary, came the dealers' opportunity to have the discount question reopened. Now it has been agreed that private buyers of British made trucks will be treated as follows:

To the owner or buyer of one vehicle, no discount; two to five vehicles, 2½ per cent; 6 to 10 vehicles, 5 per cent; 11 vehicles and upward, 7½ per cent, agents to give the same terms and to buy at a flat discount of 10 per cent with rebates. A buyer of 50 vehicles will receive the full discount to the exclusion of agent's commission on terms to be arranged by the manufacturer.

Unusual Demand For Labor

SAGINAW, Mich., April 28—The government employment office reports an unprecedented demand for laborers from local plants. Nearly 100 men are placed at work daily and the office is encountering considerable difficulty in finding suitable men. Not even during the war did the employment office experience a greater demand for men than at present.

Sixth Annual Foreign Trade Convention

Government Control of Industry Decried—Allies Need Long Credit—Reciprocal Trade Advocated

CHICAGO, April 25—The Sixth Annual Foreign Trade Convention closed here to-day following a meeting of 1700 delegates, who crowded every session and displayed a keen interest in the development of American foreign trade.

Demand that the U. S. Government should keep its hands off industry, made by Edward Hurley and others, met with the unanimous approval of all. Less Government ownership and interference with industry was practically the keynote of the meeting.

America cannot look forward to a large export business with her Allies and must be prepared to extend long term credit, abolish cash against document at New York, and invest in large amounts in the securities of our Allies. Great Britain, France and Italy cannot allow imports without danger to their existence until they have established their export business.

A reciprocal trade was waged by practically every speaker on the basis that export business cannot be healthy unless there is both purchase and sale, both import and export, and it is good business for the United States to buy its raw materials for conversion into finished products from those countries to which it exports them.

Neither Great Britain, France nor Italy can spare raw materials, and any export business we could do would only serve to further aggravate the present unstable conditions.

The convention was presided over by Alba B. Johnston, president of the Baldwin Locomotive Works, and O. K. Davis, secretary of the association. James E. Farrell, as president of the association, opened the meeting.

Numerous papers were read relating to advertising, foreign exchange, direct selling, shipbuilding and other subjects pertinent to export trade.

A banquet was held, attended by all of the delegates, presided over by John J. Arnold of the First National Bank of Chicago. It was voted to hold the next convention at San Francisco in 1920.

French-American Banking Corp. to Promote Trade Between France and U. S.

NEW YORK, April 29—The French American Banking Corp. has been organized with a capitalization of \$2,000,000. Half the stock is held by American interests and the other half by French. It is intended to promote trade between the two countries by facilitating banking advantages in each.

The Comptoir National d'Escompte de Paris holds 50 per cent of the stock, and the First National Bank of Boston and the National Bank of Commerce in New

York each holds 25 per cent. The incorporators are: James S. Alexander, president of the National Bank of Commerce in New York; Daniel G. Wing, president of the First National Bank of Boston; Maurice Silvester, American representative of the Comptoir National d'Escompte de Paris, who will be president of the new company, and others. There will be 12 directors, 6 representing the American and 6 the French group.

Highways Transport Committee on Peace Basis

WASHINGTON, April 29—The Highways Transport Committee of the Council of National Defense has been reorganized on a peace basis. It will continue its work of promoting the greater use of the motor truck for merchandise transportation. It consists of the following: Chairman, John S. Cravens of the Council of National Defense; James I. Blakslee, fourth assistant Postmaster General; J. M. Goodell, consulting engineer; James H. Collins, investigator in Market Survey; R. S. MacElwee, second assistant chief, Bureau of Foreign and Domestic Commerce; executive secretary; Charles W. Reid; director of the council, ex-officio, Grosvenor B. Clarkson. It will be assisted by the Highways Transport Committee Advisory Board composed of William Phelps Eno, Washington; Prof. Arthur H. Blanchard, New York; C. A. Musselman, Philadelphia; Raymond Beck, Akron, and John T. Stockton, Chicago.

269,727 Cars in Canada

REGINA, Sask., April 28—In 1914 there were only 67,415 automobiles in all Canada. By the close of 1918 that total had been swollen to 269,727. Ontario has the largest number of cars of any province in Canada, 109,734. Quebec is second in population, but has only 28,338. Saskatchewan in 1918 had 47,239 cars. Saskatchewan with only a third of the population of Quebec has 66 per cent more cars.

Lundane in Charge of Black & Decker New York Office

NEW YORK, April 30—G. R. Lundane has been placed in charge of the office of the Black & Decker Mfg. Co., Baltimore, just opened in the Equitable Building, 120 Broadway, and will supervise its sales for New York City and the state of Connecticut. Mr. Lundane was formerly service manager for Thos. B. Jeffery Co., Kenosha, Wis., and has recently been connected with Findeisen & Kropf Mfg. Co., Chicago.

United Brass & Aluminum Gets Foundry

PORT HURON, April 28—The United Brass & Aluminum Mfg. Co. is erecting a gray iron foundry addition. The proposed foundry will be 72 x 100 ft. and will be ready within 90 days.

Mystery Surrounds Details of Relaxation of British Embargo

Situation Is Complicated by Absence of Definite Details Relative to the Extent to Which American Automotive Manufacturers Can Take Advantage of New Regulations—Efforts Being Made to Obtain Ruling

NEW YORK, April 29—Although details additional to those published in AUTOMOTIVE INDUSTRIES of April 24 concerning the relaxation of automotive import restrictions by the British Government are now available, the position is yet far from clear.

As matters stand at present, manufacturers who were either not in existence or were not exporting in 1913 are precluded from sending their products into the United Kingdom under the terms of the relaxation. Another point which has been raised, but which as yet remains unanswered, concerns the status of British distributors or dealers representing American automotive manufacturers.

It would appear that application for license to import must be made by the British agent of the American maker—not by the latter. It is anticipated that trouble may arise in the case of a dealer who in 1913 was handling a car which is now eligible under the new ruling, but who no longer continues to sell that car. The question has been asked "Has the dealer of 1913 power to make the application for license in view of his 1913 status, does the right to apply for license go with the change of agency, to the 1919 dealer and what is the position of the first-named dealer (the 1913 man) if the car he now handles is not eligible for importation under the relaxed restrictions?"

The National Automobile Chamber of Commerce has cabled England, asking for further information on these points, and it has also asked for a conference with the Department of State officials and with Prof. Kennedy, commercial attaché at London, who is now in the United States. At this interview it is proposed to ask for the admission of makes of cars which were not imported into the United Kingdom in 1913, to secure, if possible, an increase in the imports allowed by the British and to obtain a relaxation of the French import restrictions.

In this connection the War Trade Board at Washington has issued the following circular:

"The War Trade Board announce, for the information of exporters in the United States, that they have been informed that the Controller of Import Restrictions of Great Britain has issued notice that British import licenses will be issued admitting into Great Britain automobiles up to 50 per cent of the number (or shipping measurements) of

the quantity imported up to September 1, 1913. Each importer must apply for an individual import license and submit a sworn statement as to his imports during 1913.

"Under this ruling the term 'automobile' covers motor vehicles of all kinds, including cycles and accessories.

"In making the above announcement the War Trade Board wish to call attention to the fact that they are not in a position to speak authoritatively on foreign import restrictions, but are merely transmitting the above information for the convenience of those on the War Trade Board's mailing list. Inquiries with regard to foreign import regulations should be addressed to the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., as that Bureau endeavors to keep informed on the import regulations of foreign governments."

Inasmuch as the U. S. Government records relating to the export of automotive products are compiled on a basis of the fiscal year, which ends June 30, and as the annual volumes dealing with

8,000 Tractors Shipped to Canada in Two Months

OTTAWA, Ont., April 26—According to figures compiled by Dominion authorities, more than 8,000 tractors were shipped into Canada by United States manufacturers during December and January. During the year 1918 21,691 American-built tractors were exported to Canada, 12,805 in 1917 and 3,693 in 1916. There is no import duty on tractors, and it is believed there will be none for the remainder of the year. Canadian tractor makers, however, are insisting on the replacement of the import duty, as but a few hundred tractors were made in Canada during 1918, chiefly because of American competition.

Russian Trade with U. S. Encouraged

NEW YORK, April 29—The commercial department of the representative of the Russian Soviet government in the United States has been organized to encourage American manufacturers in

the subject do not give the figures month by month, it is not an easy matter to arrive at totals of our 1913 exports to the United Kingdom covering the period from January 1 to September 1.

A search among the actual monthly records of 1913 has revealed the following data:

Automobiles Imported by the United Kingdom from the United States

| 1913 | Number | Value |
|----------------|--------|-------------|
| January | 374 | \$258,463 |
| February | 431 | 359,799 |
| March | 633 | 462,696 |
| April | 373 | 292,167 |
| May | 473 | 354,686 |
| June | 386 | 289,457 |
| July | 309 | 232,792 |
| August | 461 | 374,098 |
| | 3,431 | \$2,624,158 |

The following figures, compiled by the Bureau of Foreign and Domestic Commerce, represent our automotive exports to the United Kingdom for the calendar year 1913, as distinct from the fiscal year.

| | Number | Value in Pounds Sterling |
|---|--------|--------------------------|
| Complete cars | 3,619 | 744,392 |
| Chassis only | 328 | 71,270 |
| Tires, not imported with vehicles | | 224,428 |
| Other parts | | 500,988 |
| | 3,947 | 1,541,078 |

Pending the arrival from England of full details concerning the relaxation of import restrictions, together with a definite pronouncement as to the actual conditions imposed, their nature and a definition as to what firms are likely to be affected adversely, either because they were not exporting to the United Kingdom in 1913 or for other reasons, there is but little to be said either in the way of criticism or commendation.

Every effort is being made to obtain official rulings on the various points which are now open to misconstruction and no time will be lost in communicating the results to American automotive products makers.

the possibilities of trade with Russia. Circulars containing complete lists of former exports to Russia and present needs are being distributed for this purpose. American agricultural machinery, tractors, plows, harvesting machines, etc., are mentioned as especially suited to Russian needs. Factory, mining and road-building machinery, electrical supplies, cars and trucks are among the American manufactures that would find a ready market in Russia. The organization will make purchases in the United States of materials needed in Russia and will also undertake the sale of Russian materials here.

Surplus Copper Sold

WASHINGTON, April 30—Surplus stocks of copper held by the War Department are to be sold by the United Metals Selling Co., New York City. This material will be sold over a period of time, at current market prices, and will be marketed in such a way as not to affect prevailing price or conditions.

British Council on Imports Appointed

Board of Trade Investigating Imports Restrictions — Demand for Cars Stimulates Action

LONDON, April 29—The president of the Board of Trade, Sir Albert Stanley, has taken the unusual course of investigating the imports restrictions problem by appointing a council, the usual proceedings here in such matters being to refer them to a committee either of members of the Legislature or one solely representative of the business and commercial interests concerned.

The council to deal with these matters has appointed five subcommittees, which will deal with as many groups of commodities. Motor trade interests share with manufactures of wood the task allotted to the third subcommittee.

Machinery and hardware have the fourth subcommittee for their investigations. The Protection on Tariff party's interests appear to be disproportionately looked after as regards the motor imports group; at least two of the members, Edward Manville and Sir Alfred Bird, being well-known protectionists, the former chairman of the Daimler interests and president of the Association of British Motor & Allied Manufacturers, whose chief policy, it seems, is to put a ring around the British trade in the interests of his co-manufacturers. Sir Alfred Bird is a director of the Lanchester company.

However, it may be taken for granted that the importing motor trade interests will make every effort to state their case, which as time goes on is growing stronger in consequence of the increasing call for cars and the swelling chorus of public dissatisfaction with the dog-in-the-manger attitude of the Government in its efforts to please the British manufacturer, who so far seems to have made little effort to begin manufacturing.

One of the defenses made for this procrastination is the state of unrest in the labor world, but it so happens that there are at hand some details of the result of the Ford action in starting the year with a 40-hr. week, whereas the new national standard working week is 47 hr. in most trades and 44 in a very few branches.

The following details are taken from a note in the current number of the *Motor Trader*:

It is, of course, common knowledge that on Jan. 1 a 40-hr. week was inaugurated in the Ford factory, with a minimum wage of 45 cents per hour. A workman with 6 months' service to his credit receives a bonus of 6 cents per hour, so that while "probationers" draw \$18.33 per week the minimum weekly pay for the longer service man is \$20.83. Some 80 per cent receive more than that.

"When the new scale of pay came into operation and the working hours were reduced from 48 to 40 per week, the two factors combined were found to be equivalent to an increase in wages of

38.8 per cent. At the end of January the increased cost per car for labor was not 38.8 per cent, but 10 per cent, and at the end of February it was only 3 per cent.

"Here we have proof sufficient that it is possible to combine in a British works short hours with an almost undiminished output, and a high wage. Yet if there is one plea more than another now being voiced in the public press, it is that British manufacturers cannot compete because their workers will refuse to speed up production to make up for the shortened working week and higher rates of production costs.

Sir Percival D. Perry, the head of the British Ford interests, in his explanation of the situation notes the effect of the restriction on imports. He said that if the Government in December last had removed the embargo on colonial imports, instead of waiting until early March, it would have been possible to obtain from the Ford factory in Canada certain components which would have increased the output from the Trafford Park, Manchester, works very materially. The difficulty of obtaining them left the English company no alternative but to organize the factory on the basis of a weekly production of 350 cars rather than the 500 which would have been possible.

If the embargo had been removed the price of the Ford car here would have been raised to \$1,000 and not to \$1,250.

Gray & Davis Has \$248,415 Surplus This Year

BOSTON, April 29—In the balance sheet of Gray & Davis, Inc., for the year ended Dec. 31, 1918, the profit and loss deficit of the past two years has entirely disappeared and a surplus of \$248,415 appears for the first time. The complete statement issued follows:

| ASSETS | | |
|-------------------------------------|-------------|-------------|
| | 1918 | 1917 |
| Plant, equipment, etc... | \$633,506 | \$622,691 |
| Investment | 253,405 | 253,405 |
| Good will, patents, etc... | 300,841 | 308,264 |
| Cash | 111,518 | 77,176 |
| Accounts and notes receivable | 285,868 | 260,198 |
| Inventories | 842,178 | 842,808 |
| Liberty bonds | 450,000 | |
| Ford starter, etc..... | | 86,250 |
| Preferred stock in treasury | 10,581 | |
| Advance payments | | 7,938 |
| Prepaid expenses | 18,840 | 19,039 |
| Profit and loss deficit... | | 221,635 |
| Total | \$2,653,332 | \$2,739,404 |
| LIABILITIES | | |
| | 1918 | 1917 |
| Capital stock | \$1,961,300 | \$1,850,000 |
| Accounts and notes payable | 150,900 | 798,169 |
| Dividends unpaid | 61,866 | |
| Expenses accrued | 32,962 | 52,203 |
| Reserve for bond redemption | 7,500 | 6,667 |
| Reserve for munition contract | 190,589 | |
| Deposits on contract... | | 32,363 |
| Surplus | 248,415 | |
| Total | \$2,653,332 | \$2,739,404 |

Big Tractor Future in Argentina

Must Overcome Competition with Horses and Cheap Labor—Plenty of Education Needed

NEW YORK, April 26—George E. Reed, a partner of Pratt & Co., Buenos Aires, Argentina, which has been connected with the sale of automotive apparatus in Latin America for many years, sailed to-day for Buenos Aires, after spending several weeks in America, arranging for new lines of merchandise, one of which includes the Argentine rights on the Cleveland tractor. Pratt & Co. has Argentine rights on Delco light. A few years ago it handled cars, trucks and accessories, but is now handling only tractors and electric lighting outfits in the automotive field.

Expects Big Tractor Development

Mr. Reed expects a big development in the tractor field in Argentina, which is essentially an agricultural country. He expects the growth to be rather slow, as the heavy traction engine type of farm tractor used in Argentina some years ago made anything but a favorable impression, largely because of the service problem connected with it and the difficulty of securing competent mechanics to keep the machines working. The tractor industry was very materially slowed up because of this.

There are one or two other conditions that will hold tractor sales at a slow pace. Foremost is the price of gasoline, which is selling at \$1.50 per gallon, in the central part of the country, although selling at 67 cents per gallon from curbside pumps in Buenos Aires. This fact, placed beside the cheap price of farm labor, indicates what the Argentina dealer has to face. Horses in the central part of Argentina, or "the camp," as it is usually called, are selling from \$8 to \$9 apiece, and farm help, competent to handle horses, can be had at \$13 a month. Food for the horses is practically negligible in that they are generally on pasture all the time. It is expected that a competent person to operate a tractor will have to be paid \$30 a month or more.

But the greatest tractor problem is going to be that of service. Some of the farmers are hundreds of miles from railroad stations, and in general the farmers in the farming vicinity around Buenos Aires and Rosario are much farther from the small town than in America. In Argentina the capacity of the small town dealer to give service cannot be compared with that of America, so that it is going to be a man's job to put a tractor across in Argentina, which will undoubtedly be one of the greatest tractor markets outside of the United States and Canada.

Full Instructions Needed

Mr. Reed thinks that what is needed most in the merchandising of tractors in Argentina are very complete descriptive catalogs, instruction books, maintenance

charts and price lists in Spanish. For the Argentina farmer these books will have to be much more elementary than the corresponding books in America. The field of the tractor has been established in the United States and development started. In Argentina it has yet to be established.

The average farm in Argentina is many times as large as the American farm. In fact, there are many farms that contain 9 square miles, or 5760 acres. Such farms offer good opportunities for the tractor. It is not certain just what type of tractor will be most suitable for the Argentina field, and this can be determined only after considerable experience.

Mr. Reed says that Argentina is short of cars, owing to the fact that the port of Buenos Aires has been practically closed since early in January, due to political and social conditions. Business is very slow throughout the agricultural or camp area, as there are no buyers for wheat, meat and wool, the products of the farms, and in consequence the farmers are not purchasing as they normally would. In spite of this, the majority of the salesrooms in Buenos Aires are practically empty of automobiles.

Some months ago there was what literally amounted to a tire "war" in Argentina, due to most of the dealers being overstocked, which started price cutting. Argentina is very heavily stocked with tires to-day, and the present year will, in all probability, not be a profitable one for tire trade.

Decrease in Army Expenditures

WASHINGTON, April 28—The Aircraft Production division decreased its expenditures in March, 1919, by 38 per cent as compared with the average previous month's withdrawals from the treasury. Military aeronautics decreased 52 per cent. Military aeronautics expended \$2,518,000 and aircraft production \$11,082,000 in March, 1919. Average monthly withdrawals for previous months were \$18,000,000 for aircraft production and \$5,230,000 for military aeronautics, these averages being for the months of July 1, 1918, to Jan. 31, 1919. Total expenditures for the army in March, 1919, were \$494,241,000 as compared with an average monthly expenditure of \$850,866,000 for the preceding seven months.

Reconstruction Information Offered to Industry

WASHINGTON, April 28—The Reconstruction Research Division of the National Defense Council is now ready to give the business world whatever information relative to reconstruction it has been able to compile. The division has charge of all the federal official bodies and has access to information relative to foreign reconstruction activities and also data relative to domestic business, which has been gathered during the war by the various war administration boards. Manufacturers who are desirous of securing any of this information can do so by applying to the committee.

Completing Delivery of War Orders

Over 90% of Some Equipment Turned Over—Small Amount Not Finished

WASHINGTON, April 26—Delivery of airplanes, compasses, propellers, cameras, balloons and machine guns ordered by the War Department averages over 90 per cent of the orders placed. Delivery of motor trucks, aviation fabrics, bombs and engines, etc., averages between 51 and 90 per cent of the orders placed, and deliveries of balloon fabrics, Hispano-Suiza 300 hp. engines, etc., average less than 51 per cent of the orders placed. Of the 4846 DeHaviland-4 planes which were ordered 4842 have been delivered, and of the 62,075 machine guns ordered 57,660 have been delivered. Seventy-seven motor truck units' outfits were ordered, of which 69 have been delivered. Following are the statistics showing the status of the Air Service orders on March 23, 1919:

Deliveries of Over 90 Per Cent

| | Orders | Deliveries | Per Cent |
|---------------------------------|--------|------------|----------|
| De Haviland-4 planes.... | 4,846 | 4,842 | 99.9 |
| Compasses | 12,650 | 12,644 | 99.9 |
| Cameras, gunnery training | 1,609 | 1,599 | 99.3 |
| Oak lumber (1000 ft.).... | 311 | 308 | 99.0 |
| Balloons, kite type "R".... | 910 | 898 | 98.6 |
| Spare (train) propellers.... | 33,631 | 33,064 | 98.3 |
| Gun yokes | 20,607 | 20,007 | 97.1 |
| Oxygen apparatus | 6,100 | 5,609 | 92.0 |
| Lewis machine guns..... | 43,950 | 40,294 | 91.7 |
| Vickers machine guns.... | 18,125 | 16,366 | 90.3 |

Deliveries of 51 Per Cent to 90 Per Cent

| | | | |
|-----------------------------|---------|---------|------|
| Motor truck outfits..... | 77 | 69 | 89.6 |
| Airplane fabrics (1000 yd.) | 11,568 | 10,263 | 88.7 |
| Hispano 180 hp. engines.... | 6,000 | 5,075 | 84.5 |
| Handley-Page laminations | 2,000 | 1,660 | 83.0 |
| Hydrogen cylinders | 172,800 | 142,300 | 82.3 |
| Cameras, observation | 1,351 | 1,051 | 77.8 |
| Oxygen tanks | 17,000 | 13,077 | 76.9 |
| Synchronizing devices | 24,226 | 17,650 | 72.9 |
| Bomb sights | 16,544 | 11,630 | 70.3 |
| Bomb releases | 15,850 | 10,362 | 65.3 |
| Flare bracket holders..... | 23,037 | 14,542 | 63.1 |
| Cherry lumber (1000 ft.).. | 1,006 | 618 | 61.4 |
| Gasoline gages | 1,450 | 858 | 59.2 |
| Cable (1000 ft.)..... | 3,310 | 1,720 | 52.0 |
| Flares | 162,248 | 83,000 | 51.2 |
| Winches | 236 | 121 | 51.2 |

Deliveries of 51 Per Cent or Less

| | | | |
|-----------------------------|--------|-------|------|
| Cotton (1000 yd.)..... | | | |
| Mahogany (1000 ft.)..... | 22,352 | 9,984 | 44.7 |
| Balloon equipment units.... | 400 | 87 | 21.8 |
| Hispano 300 hp. engines.... | 500 | 101 | 19.2 |

Value of Surplus Supplies Sold

WASHINGTON, April 25—Sales of surplus supplies, as reported to the Director of Sales to April 11, include:

| | |
|-----------------------------------|-----------|
| Airplanes | \$999,237 |
| Non-ferrous metals and scrap..... | 746,709 |
| Ferrous metals and scrap..... | 255,509 |
| Oils, grease, etc..... | 183,993 |
| Motors and vehicles..... | 1,256 |
| Motor vehicle accessories..... | 839 |
| Trucks and trailers | 519 |

Hanch Acquainted with French Problems

PARIS, April 15—C. C. Hanch, who has been representing the National Automobile Chamber of Commerce at the Inter-Allied Conference of Automobile Manufacturers, left Paris to-day for London. It is the intention of Mr. Hanch to sail for America from Liverpool on

May 3. During his stay in France Mr. Hanch was in close touch with the leading automobile manufacturers.

Among the subjects which have been discussed are standardization, regarding which the French are now particularly interested: the diminution of taxes on automobiles; the dates of the national shows and the treatment to be accorded to foreign exhibitors.

The value of standardization is fully appreciated by the French manufacturers and a wonderful opportunity now presents itself for working hand in hand with the Society of Automotive Engineers. There is a danger that the French makers will tackle standardization purely from their own standpoint and thus set up standards which will have nothing in common with those in force in America and England.

French Government to Go Into Production

PARIS, April 16—A project is afoot to make use of a portion of a new state arsenal at Roanne for automobile and aviation production. In the technical report which has just been issued it is stated that the shops erected for the production of 75 mm. shells are particularly suited for aviation engine and automobile parts in big series. These shops are particularly well provided with Gridley automatics.

The "Verdun" building and 155 mm shell shops are suitable for agricultural implements and tractors. For these latter it is proposed to make use of trucks and tractors returned from the front. The "Marne" buildings are designated as suitable for aviation and automobile spare parts. The presses in these buildings are capable of handling all the stampings necessary for agricultural implements and tractors.

Car manufacturers are protesting against the state coming into direct competition with their industry by this proposed transformation of the Roanne arsenal.

Tractor Imports to France to Stop July 1

PARIS, April 16—Agricultural tractor imports into France will be prohibited on July 1, if French makers are in a position to meet national requirements, is the official statement made by Minister of Ravitaillement Boret.

At the present time not only are tractor imports permitted, but the Government is buying American machines and selling them to groups of French farmers. In addition to this, as has already been said, the Ministry of Agriculture is offering a subsidy equal to half the cost of the machine to purchasers of tractors who give the necessary guarantees that the tractors will be kept at work.

It is doubtful if the French makers will be in a position to meet requirements by the date indicated. The biggest producers at the present time are Renault, De Dion-Bouton, and Latil, but others who are rapidly getting into production are Peugeot, Schneider, Paris General Omnibus Co., Delahaye and Gnome & Rhône.

Want Discriminatory Tariff Against American Cars

Inter-Allied Congress Indicates Desire of European Manufacturers for Protection Against American Automotive Products—Government Support Doubtful

PARIS, April 10—The discriminating attitude of European automobile makers against America in the recent inter-allied automobile conference here, when a 10 per cent duty among European Allies and a 45 per cent duty against America was discussed, shows the attitude of the European maker toward America. No vote was taken in the Congress, and had there been, the European representatives could have out-voted America 13 to 1.

The English makers are reported to be the prime movers in this discriminatory tariff against America. France is hesitating on the question and Italy is indifferent because of the progress she made in automobile and truck production during the war. This lack of uniformity of views and broadly diversified interests are in themselves sufficient reason why a discriminatory policy against America cannot hope to find favor in the eyes of European governments. The British public is already well nigh disgusted with the exorbitantly high prices the British makers are asking for their automobiles and also the slowness with which they are getting back into their manufacturing stride.

Hanch Visits Italian Factories

Charles C. Hanch, American delegate to the congress, returned to Paris this week after a trip through Italy, where he visited the automobile factories in Turin and Milan. It is his intention to remain in Paris for a couple of weeks, during which time he will be in touch with the French automobile manufacturers and American officials now in France. At the end of this time he will go to England for two weeks before sailing for home.

The presence of Mr. Hanch in Europe has given an opportunity to the automobile manufacturers to discuss completely the somewhat difficult question of import duties as they affect them individually. A certain amount of misapprehension appears to exist as to what really took place at the inter-allied conference attended by accredited delegates from France, England, Italy, Belgium and the United States. This can be attributed to a rather unfortunate attempt on the part of the French officials to maintain undue secrecy; the inevitable consequence was that an effort was made to pierce the veil.

European Makers Want Protection

Throughout Europe there is a feeling, varying in intensity, that the automobile industry ought to be protected against foreign competition for a certain period. In a small degree the European manufacturers want protection against one another, but they all want protection, for a period varying from a few months to

a few years, against America. English manufacturers are the most resolute partisans of a system of protection against America. It is believed that the English delegates at the automobile conference were responsible for the suggestion that there should be reciprocal duties among the Allies, on a basis of 10 or 15 per cent, but that in no case should the duty be lower than that in force before the war. The practical outcome of this would be that France, England, Italy and Belgium could work together on a moderate basis of 10 to 15 per cent duty, while against America there would be a 30 or 45 per cent duty, with the impossibility of America dropping her duty in order to put herself on an equality with the Europeans. In other words, there would be a minimum tariff among European nations and a maximum tariff in all these countries against America.

This suggestion is only important as a revelation of the working of the minds of European automobile manufacturers. It appears therefore that on this question the congress limited itself to a complete exchange of views, when Mr. Hanch took the opportunity of advising the European makers on American opinion and conditions.

It is but a natural outcome of the events of the last 5 years that the European automobile industry should now be in a state of unpreparedness and dissatisfaction. While in America the whole of the automobile industry was controlled and transformed from peace to war conditions, according to a uniform plan, in Europe the conditions varied according to the countries and also according to the factories in those countries.

French Production Ceased During War

In France the whole of the factories were shut down at the beginning of August, 1914, by the law calling every man to the colors. Trained engineers and unskilled laborers went into the army on the same footing and often with the same rank. It was not long before the folly of this plan revealed itself and engineers and skilled workers were called back and returned to the factories to make shells or other war equipment ordered by the Government. There could be no question of building automobiles for private use, for the right to travel by automobile practically ceased with the outbreak of the war. While the automobile factories were making shells, trucks for the French army were being bought in America. As the war progressed the automobile factories gradually changed over from shells to aviation engines, tanks, trucks, tractors, staff cars and other similar material for which they were more suitably equipped. The out-

come was that when the armistice was signed a few French automobile factories were making shells, many were building aviation engines, some were on tanks and a small number on more or less purely automobile work.

In England conditions were different. Military service being voluntary in 1914, automobile manufacturers tried to avoid accepting war contracts, their idea being, evidently, that the war could not possibly last more than a few months, and at the end the advantage would lie with the man who had kept his organization together. The Government had to force the automobile manufacturers into war work, this work consisting at first in the production of shells. Later the development was similar to that of France, the factories being big producers of aviation engines, while trucks were being purchased in large quantities in America.

Italy's Truck Program

Italy had an entirely different experience. Coming in later, the Italian Government had time to profit by the mistakes of France and England, for instead of converting their automobile factories into munition works and going to America for trucks, they intensified the production of their automobile factories on automobile work, and were able to meet not only all their own army automobile requirements, but to supply immense quantities to France and also important numbers of vehicles to England and even to the American army.

Finally, the Belgian industry was picked clean by Germany. Of the three leading European nations Italy enjoys the most favorable position, thanks to the original foresight of her Government. In both France and England there are some factories which have changed their organization so little that at the present moment they are capable of producing more automobiles than immediately before the war. On the other hand, there are establishments which have not built an automobile for 4 years and cannot get back into production in less than a year.

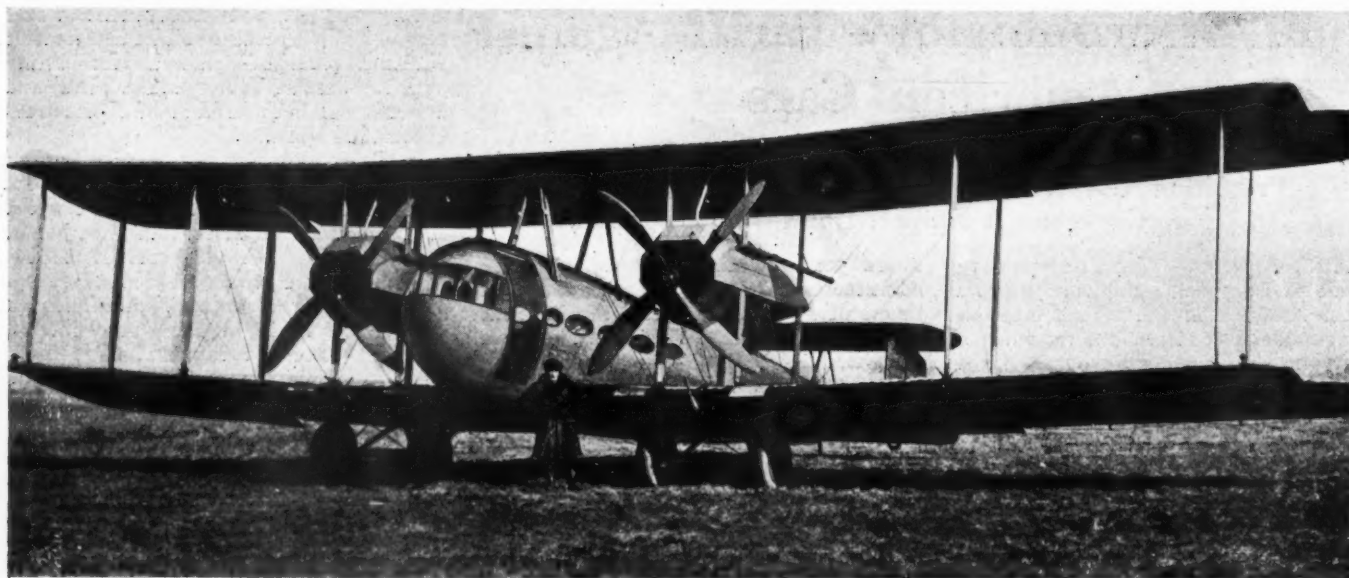
The European markets are not equally favorable to American imports. American automobiles always have been and always will be difficult to sell in Italy, while during the war Italy has become an important automobile exporting nation. From the American viewpoint France is a better field, but still a very difficult one to do business in. Finally England always has accepted American automobiles readily and is prepared again to purchase them in quantities.

Dividends Declared

Pennsylvania Rubber Co., Jeannette, Pa., eleventh quarterly dividend, 1 1/4 per cent on preferred, payable June 30 to stockholders of record June 15.

Borg & Beck Offices Moved to Chicago

CHICAGO, April 29—The Borg & Beck Co., which recently opened a factory here, has moved its offices from Moline to 914 S. Michigan avenue. The plant at Moline will be continued.



Vickers airplane with large twin engines

New British Airship

WASHINGTON, April 25—Vickers, Ltd., of London has announced the approaching completion of the R-80, a new rigid airship, which it is believed will fly the Atlantic with ease. It is expected that the machine will be ready for trials in May. It has been designed entirely by Vickers. The ship has bow-mooring attachments that will permit it to be moored out from a tower in such a manner that it can turn in any direction and lie with the wind. Four cars are attached to the hull—a forward control car and machinery car, and two wing cars for machinery fitted on opposite sides of the ship. There are 4 Wolseley-Maybach engines of 240 nominal brake horsepower each. The airship will carry a crew of 16 and will have accommodation for a good number of passengers.

British Car on Co-operative Basis

LONDON, April 10—With the purchase of the Bell Motor Co., Ravens-thorpe in Yorkshire, by the Co-operative Wholesale Society, the production of a popular priced car on a co-operative basis will be inaugurated. The C. W. S. has been in existence since 1864, organized to buy goods wholesale and sell it to societies forming its membership. Production is expected to begin at once. No details of organization or production have been disclosed.

Co-operative Production to Compete with American Car

LONDON, April 10—British motor manufacturers who have decided to pool their interests in a standard product for the largest range of mass production, and the similar step taken among the French trade, is largely intended to help realize the advent of a successful competition in price and quality with the American car in the colonial market. The Buick six, for instance, can be landed in Australia from the United States for \$2250, whereas the British Rover and

Arrol Johnston cars, now listed at \$3,500 even in Great Britain, bring at least \$500 more in Australia. Competition at such rate is out of the question. The colonies are independent of the mother country in their domestic affairs, and it is all too probable that while our manufacturers are holding back restarting the industry and blaming the workers and everybody else but their own lack of confidence, courage, energy and prevision, the American trade will reap the harvest of cars in territories peculiarly British, and having a preferential tariff for British goods.

New Muffle Forms for Heat-Treating

LONDON, April 1—War-time products demand advanced and varied forms of muffle for heat-treating pieces several feet long. Some of the muffles thus called for were quite small and were adapted for heating electrically, but for the most part gas was used for the larger sizes. One type of muffle evolved is vertical, after the fashion of a retort in which the article to be treated is suspended.

The exclusion of air is so complete and the gases so well directed from contact with the pieces being treated, that they invariably emerge without the scale and soft-spots incidental to scaly pieces. Crank and cam shafts and axles are being annealed and otherwise restored after crystallization through protracted use.

The virtues of this new type muffle appear to be due to a combination of perfect sealing of the retort-like chamber, the presence of an inert gas, and suspension of the piece (or pieces) as opposed to the alternative practice of resting the piece (or pieces) in contact with the muffle floor as in the horizontal muffle.

These vertical muffles or retorts were much used in the war for treating airplane-struts and landing chassis and their possible value is being inquired into by cycle and motor makers, because of the seeming greater freedom from distortion of parts thus treated.

Standardization Work in England Undergoing Changes

LONDON, April 3—The standardization work of the Institution of Automobile Engineers has been undergoing several changes, and because of this has slowed up a good deal. This work has been carried on by a joint technical committee representing the interests of the motor industry and also the engineers. The technical committee of the Society of Motor Manufacturers & Traders has turned its functions over to a technical committee to be formed by the Association of British Motor & Allied Manufacturers, which means that a complete division of all the committees and sub-committees working on automobile standardization will have to be made, and the complete work will correspondingly be retarded for some time.

Because of this all engineering matters related to the automobile industry will be referred to the technical committee of the Association of British Motor & Allied Manufacturers. This committee will form the only means of communication between the automobile industry and the British Engineering Standards Association, which is the one organization in Britain that approves of standards. Once a standard is issued by this association it is immediately accepted by the manufacturers of the country.

More Room for Union Truck Co.

BAY CITY, Mich., April 28—The Union Motor Truck Co. has increased its capital stock to \$500,000 and a new factory will be built at once. The company was organized 3 years ago. A small company began experimental work, putting the first Union truck on the market a few months later. Manufacture on a small scale continued, but because of the war the company found great difficulty in getting material. This difficulty has been removed and during the last few months it has received more orders than it can turn out with its present facilities.

Harper Sons & Bean Enter Car Field

LONDON, April 10—The firm of Harper Sons & Bean, Ltd., established in 1826 and employing some 10,000 persons in 3 plants in the Birmingham-Wolverhampton area, and whose output was principally stampings, forgings and castings, recently acquired the patterns, jigs and other manufacturing rights in the Perry light-car. There is also intended to be listed early next year a special new model styled the Bean car, designed for mass production. Meanwhile up to about 2000 of the Perry light-car, suitably improved, will be put through for the season 1919-20.

The company's shops are 600 ft. long and the foundry has an output of 1000 tons of castings a week. The company for many years has supplied a vast quantity of stampings to the motor trade and also, to a smaller extent, numbers of completed components, such as front-axle assemblies, etc. It is rumored that the mass production car will be listed at \$1000 and will be specially suited for the colonial trade.

Copeman Laboratories Reorganized

FLINT, MICH., April 25—The Copeman Laboratories, Inc., has been purchased by New York and Detroit banking interests and the business will be continued by the new stockholders under new management.

Lewis Searing of New York, formerly vice-president and general manager of the Denver Engineering Co., Denver, Col., has been elected president and general manager and has already assumed active control of the business. L. G. Copeman, formerly president, has been elected to the board of directors. Production will start at once.

Detroit Culto-Tractor Locates

DETROIT, April 26—The Detroit Culto-Tractor Co., a new company incorporated at \$1,500,000 for the manufacture of a farm tractor to sell at \$755, has leased the Indian Village garage on Jefferson Avenue, and is converting it into a manufacturing plant. The company plans to be in production by May 1, turning out 25 machines daily. It claims orders for 3700 machines. The company will confine its efforts to assembly at first, some machining and finishing work.

The officers of the company are: President, J. J. Rowe; vice-president, H. M. Jerome; second vice-president, H. B. Kramer; secretary and treasurer, P. H. Kramer. S. M. Duffield is sales manager and S. R. Du Brie chief engineer. Mr. Jerome will be production manager.

The tractor is a three-wheel device with a single drive wheel, and was briefly described in the March 20 issue.

Goodrich Additions Total \$93,000

AKRON, April 25—The Goodrich Tire & Rubber Co. has taken out permits for the construction of fireproof brick buildings to total \$93,000. A machine shop, costing \$49,000; an addition to a sub-station on Falor Street to cost \$15,000, and two additions to present buildings costing \$29,000 will be built at once.

**Current News of
Factories****Notes of New Plants—
Old Ones Enlarged****Austin Touring Car Sells for \$2,475**

BIRMINGHAM, ENGLAND, April 9—The prices of the Austin 20, one of England's post-war models, anticipated as one of the production jobs of the country, have been determined. The chassis list at \$1,975, the touring car at \$2,475, the coupe at \$2,975 and landaulet at \$3,125.

Durant Denies Ford Purchase

DETROIT, April 26—W. C. Durant, president of General Motors Corp., emphatically denies that the corporation is to buy out Henry Ford's interest in the Ford Motor Co, as reported in some of the daily papers.

"There is absolutely no truth in the report that the General Motors Corp. has acquired or is negotiating for possession of Henry Ford's holdings in the Ford Motor Co.

"You may deny the report emanating from New York to this effect just as strongly as you wish and sign my name to it."

Republic to Build in Canada

LONDON, ONT., April 26—The Republic Motor Truck Co. will put up a factory here as its Canadian headquarters. A site has already been chosen and the erection of the new plant will commence immediately. During the course of construction an old munition plant will be occupied.

National Body Mfg. Co. Newly Organized

NASHVILLE, TENN., April 25—National Body & Mfg. Co. has been completely reorganized as the National Body Mfg. Co., with a capitalization of \$50,000, and will immediately start production of five-passenger bodies. H. O. Blackwood, owner of the H. O. Blackwood Tire Co., Nashville, Tenn., is president of the concern, the other officers being Charles R. Wood, Nashville automobile dealer, and Pollard Caldwell, the president of the Sterling Candy Co., vice-presidents, and J. N. Moorehead, secretary-treasurer.

**S K F Industries a Holding, Sales and
Engineering Company**

Editor AUTOMOTIVE INDUSTRIES:

Through an unfortunate slip in our copy department a recent news item was sent you announcing in error that the reorganization of our interests, effective May 1, would be a physical consolidation of the underlying companies. The new company, S K F Industries, Inc., will be simply a holding, sales and engineering organization.—S K F Industries, Inc.

1,000,000 Fords Planned for One Year

DETROIT, April 29—The Ford company is now about to hit its full production stride. From 1300 cars daily this company has run production up until an average of 2600 cars were turned out each day this week. According to production officials, May will see production boosted to the 3000-car mark, and every effort is now being made to increase this to 4000 daily to meet the unusual demand.

In November the Ford company was operating on practically 100 per cent war basis. Ford did not wait for the cancellation of his contracts, but suspended all war operations the day after the armistice was signed. As a result he began to get back into peace production several weeks before any other automotive company in this district. This foresight enabled him to be operating on a 50 per cent basis by the first of the year, and he will hit his full production stride long before the other companies have fully recovered. On April 24 the Ford company had on hand 59,994 unfilled orders, and this total is increasing every day. From Aug. 1, 1919, to Aug. 1, 1920, the Ford company plans to manufacture 1,000,000 cars.

Splitdorf Closed for Inventory

NEWARK, N. J., April 25—The Splitdorf Electrical Co. has finished all Government work at its main plant, and has closed down temporarily for inventory. Manufacturing activities will be suspended until May 5, when the Government inventory is complete.

Chevrolet Turning Out 700 Cars Daily

DETROIT, April 24—The Chevrolet Motor Car Co. is manufacturing on a set schedule of 700 cars daily. Sales officials declare the demand far exceeds production.

**Schwartz Electric Back to Horns and
Other Supplies**

ADRIAN, MICH., April 26—The Schwartz Electric Co., which, during the war produced munitions, has returned to peace activities: manufacture of automobile horns and other motor supplies. The company has orders now to supply 32 car manufacturers. At present some departments are working 13 hours daily. If sufficient labor could be obtained, night shifts would be put on. The company is making 1800 small horns a day, 800 large ones, 1000 circuit breakers, and 1200 push buttons. Cord assemblies are also being manufactured.

**Service Products Corp. Will Make
Radiator Fans**

INDIANAPOLIS, April 26—The Service Products Corp. has recently been organized with \$50,000 capital to manufacture radiator fans for cars, trucks and tractors, with the following officers: President, Harry J. Enders; secretary and treasurer, R. B. Parrott, and chief engineer, R. C. Root. Annular bearing fans will also be featured.

Cole Foreign Representative Abroad

INDIANAPOLIS, April 28—Pablo Homs, export manager of the Cole Motor Car Co., will leave early in May for a trip to important foreign commercial centers to establish export facilities for the company. He has secured distribution for the Cole in Europe, South America, Australia, Mexico, Cuba and the West Indies, subject to the removal of restrictions on private trade. It is estimated that between 10 and 20 per cent of the Cole output will be exported in 1919.

Major T. P. Searight, director of H. M. Hobson, Ltd., London, makers of the Claudel-Hobson carbureter, is now in this country on a business visit.

Capt. W. J. Pearmain, late instructor of artillery, First Army, A. E. F., has returned from France and has been appointed experimental engineer with the Wallis Tractor Co., Racine. Before going overseas Captain Pearmain was in charge of the experimental department of the Mitchell Motors Co.

J. F. Richman, former superintendent and factory manager of the Cole Motor Car Co., Indianapolis, is now manufacturing manager of the Allen Motor Car Co., Fostoria, O.

Arthur Kirkland, formerly with the Bureau of Aircraft Production, has been appointed sales engineer of the Detroit Tool Co.

J. S. Holihan, former sales manager of the Standard Motor Truck Co., Detroit, has joined the sales force of the Garford Motor Truck Co., Lima, O.

J. Berge, formerly of the Stewart Warner Speedometer Corp., has been appointed chief engineer of the speedometer department of the Champion Ignition Co., Flint.

R. B. Huffard of the truck department of the International Harvester Co., Chicago, has been engaged by the Handy Motor Truck Co., Detroit, as consulting expert.

Sid J. Black is vice-president in charge of sales of the Cleveland Automobile Co., which is erecting a factory for the manufacture of the new Cleveland car.

William M. Farans has been appointed special representative for the State of New York for L. Sonneborn Sons, Inc., oil refiners. He has just been released from duty as chief petty officer in the Navy.

R. E. Manly, of the Manly Sales Co. at 6253 Ellis Avenue, will have charge of the Chicago office just established by the Fulflo Pump Co., Blanchester, O.

John F. Neville is now with the Hilo Varnish Corp., Brooklyn. He was formerly with W. A. Tottle & Co., Inc., Baltimore, and Jas. A. McCafferty & Sons, Brooklyn.

Men of the Industry

Changes in Personnel and Position

DeLisser Made Ajax President

NEW YORK, April 30—Horace DeLisser has been made president of the Ajax Rubber Co., succeeding H. L. McLaren, who resigned recently. C. R. Collins, advertising manager, severed his connection with the company a few weeks ago. His successor has not yet been appointed.

**Hunt New Sales Manager for Distell
Wheels**

DETROIT, April 30—George H. Hunt has been appointed sales manager of the wheel division of the Detroit Pressed Steel Co. For several years Mr. Hunt was manager of the branch here of the Stromberg Carbureter Co. and for the past year was local representative of the Edward G. Budd Mfg. Co., Philadelphia, and the Budd Wheel Corp.

Steward Slosson has been appointed Pacific Coast manager of the Rubber Products Co. He was for several years Coast representative for Firestone motorcycle tires. The Rubber Products Co. is increasing its manufacturing and storage space at its Barborton, O., factories. Additional office space is also planned.

F. H. Prescott has been appointed designing engineer on motor and generator equipment for the Remy Electric Co. Before going into Government service as second lieutenant in the Engineering Reserve Corps, he was a designing engineer in the automobile equipment section of the Westinghouse Electric & Mfg. Co.

Martin K. Whalen has joined the force of the International India Rubber Co., South Bend, as its southern representative. He has been acting as special representative for the Century Plainfield Tire Co.

Paul LaCroix, general manager of the Rubay Co. plant, Cleveland, has been elected vice-president of the company.

R. A. Fisher, for 18 months with the flying corps, has joined the sales and engineering force of the J. R. Stone Tool & Supply Co., Detroit. Before entering the service he was connected with the Curtiss Aeroplane & Motor Corp. and the Continental Motors Corp.

W. D. Bell, Detroit, who recently resigned from the Parker Rust Proof Co., is now connected with the Wilson Foundry Co., Pontiac, where he has charge of the board contract department.

Stephen T. Gorman has taken charge of the office of the Ladish Drop Forge Co., recently established at Detroit.

Lee to Manage Saxon Factory

DETROIT, April 28—Harry S. Lee, during the war superintendent of the Wright-Martin Corp., Long Island City, has been made factory manager of the Saxon Motor Car Corp., Detroit. Before entering government service he was manager of the Aluminum Castings Co.

H. G. Semmons, prior to the war with the Studebaker Corp., has joined the Chevrolet Motor Car Co., Flint, as assistant sales manager.

Ernest L. Kreamer, advertising manager of the Oakland Motor Car Co., Pontiac, before resigning to enlist in the army, is now a member of the Howe, Fordham & Kreamer Co., Chicago, a new law firm.

A. G. Drefs, just out of government service, has opened offices in the Book Building, Detroit, under the name of Drefs, Cunningham & Drefs. The company will act as consultants for automotive industries on problems of organization, production, distribution, finances, accounting and general taxes.

C. V. Durham, with the Buick Motor Car Co., Flint, for many years, has been promoted from general superintendent to works manager of the plants.

H. E. Westerdale, sales manager of Heath-Duplex department of McCord Mfg. Co., with Ward Keller, eastern sales manager, has resigned to form the Lexington-Ohio Co., Cleveland, to handle Lexington cars.

J. C. Given, southern district manager of the L. A. Young Industries, Inc., Detroit and Shelbyville, Ind., has been appointed sales manager of the power division.

Andrew V. Terek, recently released from the Naval aviation service, has returned to the Bantam Ball Bearing Co., Bantam, Conn., as master mechanic in charge of the upkeep of the factory.

Frederick Robinson, who for many years was vice-president and general manager of the J. I. Case Threshing Machine Co., Racine, died April 23 at the age of 57. He had been ill several years, for this reason retiring in 1915, but remaining a director of the Case company.

James Viles, chairman of the board of directors of the Buda Co., Harvey, Ill., and father of L. M. Viles, president of that company, died in Chicago, Sunday, of a complication of diseases at the age of 64. He became president of the Buda Co. in 1907.

Gasoline Legislation Defeated

SAN FRANCISCO, April 26—As a result of opposition of the trade associations and the Chamber of Mines and Oil in California, Senate Bill No. 711, which proposed to establish gasoline specifications has been defeated. It was brought

out in opposition to such legislation that the price of gasoline and its quality are matters of supply and demand, and that legislative tinkering will only result in complicating a situation which calls for the gravest scientific study.

According to late quotations, gasoline is now sold at service stations in San Francisco at 20.5 cents a gallon. The price in Portland, Seattle and Tacoma is 21.5 cents.

Cooling Fan Problems

(Continued from page 967)

ally produced in automotive apparatus will not exceed from 2 to 3 pounds in 16 in., 3 to 4 pounds in 18 in., 4 to 5 pounds in 20 and 22 in. fans.

With regard to the bearing question, I believe it is a universally known fact that cup and cone bearings, as at present supplied in radiator fans, are the cheapest bearing to make and can be bought for between 8 and 12 cents each, according to size. A great many have been used, because there were no other types of fans on the market. However, the cup and cone type is disappearing rapidly, as it was the cause of the most irritating trouble and failures. Its life is short, especially when abused. To drop a fan with cup and cone bearings on the floor, or drive it with only slight force into its supporting bracket, means the destruction of the races. The same applies to ball thrusts. Plain thrust bearings with automatic adjustment according to thrust load are the most successful. In a recent test at a motor factory, the plain thrust bearing ran for 109 hours at 1500 r.p.m. without lubricant with only a few score marks, while the cup and cone bearing under exactly the same conditions lasted only 11 hours.

Mr. Hoyt also states correctly that not one out of ten people driving a car ever oils the fan. They will much less adjust stuffing boxes, especially when these stuffing boxes require special size wrenches and are most inaccessible. On adjustable stuffing boxes you will find invariably the felt squeezed out between shaft and stuffing nut, thus providing a wig oiler to drain the oil to the outside.

Self-contained felt arrangements on the inside of the hub, which throw the oil which they wipe off the shaft back into the bearing, are the only successful type and most simple.

The radiator cooling fan, the most important cooling unit, the highest speed part and at the same time the most neglected one on any automotive apparatus, must be built simple, rigid, fool-proof and free from delicate adjustments (which will never be made) to give continuous and carefree service.

Truck Sales Managers Will Meet in July

DETROIT, April 28—The National Association of Motor Truck Sales Managers will meet here the latter part of July, as decided at the quarterly convention of the organization held in Philadelphia last week. The date of the Detroit meeting will be given out later.

Haste in Presentation of Claims Urged

Machinery for Settlements Temporary—No Statements Received by Ordnance After May 15

DETROIT, April 28—Approximately 70 per cent of war claims in the Detroit district are still unpaid. Aircraft and ordnance contract adjustment officials, whose organizations have been in operation 5 months, say it will be months before final settlement of all claims is made. The boards are now devoting their attention to hurrying the contractors into presenting their claims in proper form before May 15. Whether all claims will be in the hands of the boards by that date is a serious question and it is becoming more and more apparent that unless some of the big contractors speed up and file at once, they will be obliged to seek redress in the Court of Claims at Washington.

Of the 1500 claims coming under the jurisdiction of the Aircraft Board, 200 are still out. Packard, Lincoln, Ford, Fisher Body, Wilson Body, Willys-Overland, Buick and Cadillac are among them. Trouble in securing proper information from sub-contractors is given as one cause of delay in the presentation of these claims. It is estimated that only 30 per cent of all aircraft claims submitted to Washington for final approval have been paid. A large number of claims have been in Washington six weeks but no word as to their final disposition has been received.

Ordnance officials say 86 of their total claims have been filed. Fifty per cent of these have been passed upon by the Detroit board, but only 35 per cent have been approved at Washington. The Ordnance Board will receive no more claims after May 15. The Bureau of Aircraft Production claims officials have received no specific orders to refuse claims filed after a certain date. This board is urging contractors to file between May 15 and June 30, as after June 30 the board will be unable to promise immediate action. In a letter to Ordnance Board officials, Benedict E. Crowell, acting Secretary of War and Director of Munitions, declares that claims must be presented prior to May 15, as the present adjustment organization may not be in existence after that date.

He states: "It is nearly five months since these organizations were set up, and since their machinery was available for the process of adjustment. Nevertheless claims aggregating nearly one half of the total amount of money involved have not yet been formally presented. The organization which is handling this matter is essentially civilian in character and composed of men who have come into the department merely for the purpose of the war and who remain in this work only at a great personal sacrifice and at the urgent request of the department.

"I do not feel that I can continue indefinitely to impose that hardship and have determined that all contractors who desire to avail themselves of the existing organization in the department for the settlement of their claims must present them prior to May 15, as after that date the method of handling the claims will necessarily be changed owing to the impossibility of continuing the present personnel."

Both boards are making 50 and 75 per cent settlement in certain cases. When a contractor is hard pressed for money and when a preliminary inspection convinces the officials that the claim has been properly executed and is probably correct, an advance settlement of half or three quarters is made, the remainder being paid if the claim is found correct.

Attempt to Standardize French Tires

PARIS, April 15—At the present moment a vigorous attempt is being made to reduce tire sizes to the following: 815 x 105, 880 x 120, 935 x 135 and 955 x 155. In addition there will be one size for small light cars, but it is not certain whether this will be 710 x 90, 765 x 90, or some size which will interchange with the Ford. It is felt that five pneumatic tire sizes are sufficient to cover the entire automobile field. Michelin is using all its influence in favor of these sizes and is offering advantages in price on these standard sizes.

F-5-L Flying Boat Makes 20-Hour Flight

WASHINGTON, April 26—An F-5-L naval seaplane carrying Lieutenant Commander H. B. Grow and three ensigns made a non-stop flight covering a distance of 1250 miles in 20 hr. 10 min., establishing an American record for time and distance in that type machine. The machine was equipped with two 400-hp. Liberty engines, and made an average speed of 60 m.p.h. The flight was made at the Hampton Roads naval base and the distance covered equalled that across the Atlantic from Newfoundland to the Azores, the expected transatlantic route.

Although unsurpassed in America, a 24-hr. record was made in Germany before the war. Boehm, starting from the Johannisthal field, outside of Berlin, made a non-stop flight in a seaplane lasting 24 hr. 12 min., on July 10, 1914, but covered only two-thirds the distance. An H.S. seaplane, with full naval equipment, on regular patrol duty off Queenstown, Ireland, made a flight lasting 9 hr. 37 min., which stood as the record until this latest 20-hr. achievement.

Aviation Insurance Risks Undertaken by English Company

LONDON, April 18—The Aviation Insurance Association, an insurance organization controlled by a committee representing Lloyds, the Eagle Star and British Insurance Dominions Insurance Co. and Excess Insurance Co., has been formed to underwrite the specific risks incurred in flying. The risks include:

damage to aircraft or from other aircraft, damage to cargo, accidents to anyone in the machine or to persons or property on the ground injured by articles falling from the aircraft. This is the first time that aviation insurance has been placed on the level with other forms of insurance. A fixed tariff has not yet been established, but a schedule of rates is being prepared which will not be as prohibitive as flat rates would be.

Another English aviation insurance scheme has developed through a pool of 31 English insurance companies. In view of the heavy risks, the combined resources of the whole group will stand behind any of the policies issued by the individual companies.

Ballot Cars for Indianapolis

PARIS, April 28—(Special Cable)—Four Ballot cars comprising the Thomas team sailed from Paris on the Savoy on April 26 on their way to Indianapolis. These cars are to be driven by René Thomas, winner of the 1914 Indianapolis race, Albert Guyot, Louis Wagner and Bablot.

These four machines are special racing mounts which have been designed, built, tested and shipped in 90 days. They were designed by Henry, designer of the Peugeot cars. These cars are fitted with 8 vertical cylinders of 74 by 140 mm. bore and stroke. This number of cylinders has been selected because of the special conditions at Indianapolis, where rapid acceleration is an essential quality. The entire design was laid out with Indianapolis conditions in view.

The Ballot Co., responsible for these machines, is the leading engine manufacturer in France. Before the war it introduced engines only to the requirements of automobile assemblers. During the war the firm has been engaged in the production of aviation engines and special engines for lighting sets, pumps, machineshop trucks, and other similar products.

It was not until Dec. 24, 1918, that the Ballot Co. decided to enter for the Indianapolis race. Actual designing did not begin until Dec. 27. The four Ballot cars will remain in America for about 4 months after the Indianapolis race.

Coatalen Arrives with Sunbeams

NEW YORK, April 28—Louis Coatalen, managing director and chief engineer of the Sunbeam Co., England, arrived here this morning bringing with him the two racing Sunbeams which are to make their appearance at the Indianapolis track on May 31, driven by Dario Resta and Jean Chassagne. Mr. Coatalen expects to return to England as soon as possible after the race.

Stewart-Warner Doubles Profits

CHICAGO, April 28—Net profits of the Stewart-Warner Corp. for the first quarter of 1919, ended March 31, were \$549,653, against \$227,582 for the same period of 1918.

Reliability of Aerial Transport Essential

English Aerial Transport Committee Sees Only Limited Business Under Present Conditions

LONDON, ENGLAND, April 1—Since the signing of the armistice innumerable forecasts and articles on commercial flying have appeared in the press, mostly inspired by those at the head of the airplane manufacturing business, who are faced with the problem of finding an outlet for their production.

The majority of these have taken a rather optimistic view of the prospects. In spite of this everything to-day points to post-war aerial industry being carried on by only those firms having substantial and large interests in some business other than aircraft, which will serve them as a means of support in the event of their not getting sufficient contracts in the aeronautical line to keep their heads above water.

When the Civil Aerial Transport Committee was formed to propose to the Air Ministry the steps to be taken, the tone of its report was in strong contrast to some of these expansive predictions. That portion of the text which was made public stated that while the committee was of the opinion that the carriage of mails, and in some cases passengers also, besides certain kinds of light merchandise, might be successfully developed, the total amount of business in sight along these lines would be incapable of absorbing even a small portion of the present output in its highly developed condition.

From the pilots', and in fact from everyone's point of view, reliability is the primary essential in an airplane, and so far, though many statements have been made to the contrary, the present-day type of airplane is far from being what one might term thoroughly reliable.

In order to attain reliability, what is most needed is that the engine should have a margin of power. This means that with the engine running smoothly at about half throttle, and consequently undergoing no appreciable strain, the airplane should maintain both its forward speed and its height. Even a motor car engine, which is far heavier and more substantially built, could not be expected to last long were it run constantly on full throttle, as is the case in an airplane.

So far no airplane engine has been produced which pretends to yield any appreciable margin of power, and until such an engine is put on the market it is scarcely worth while to consider the question of aerial transport from a commercial point of view. Further, it is hardly too drastic to say that the expenditure in overhauls, crashes, etc., would be so great as scarcely to allow any appreciable profit to be realized.

On the other hand, as regards mail carrying over long distances, and to a

certain extent passenger carrying, there appear to be great possibilities, even for the present-day type of machine.

Over short distances, such as from London to Liverpool, it remains for the private individual to choose as to whether he is going to send his letters by train, which takes 5 hours, but is infallible, or whether he is going to send them by airplane and pay probably 8 or 10 cents more, which takes about 2½ hours, half as long as the train, but about one-sixteenth as reliable. Where long distances, such as from England to India, are involved, airplanes will prove to be invaluable.

It is impossible for any large firm to rely solely on aircraft production at the present time for its subsistence. The Government has many more airplanes than it knows what to do with at the moment, and the life of an airplane will be considerably long under peace conditions.

8 Uniontown Entries

UNIONTOWN, PA., April 28—Before appearing on the Indianapolis speedway on May 31, a number of the speed cars and their drivers will start the season on the track here on May 17. Among them are two Roamer specials and three Hudsons. Cliff Durant will drive his Chevrolet special. No foreign entries for this event have yet been sanctioned. Those already scheduled are:

| Driver | Car |
|------------------------------------|--------------------|
| Louis LeCoq..... | Roamer special |
| Kurt Hitke..... | Roamer special |
| Eddie Pullen..... | Hudson special |
| Ira Vail..... | Hudson special |
| Harold Simmons or J. R. Hogan..... | Hudson special |
| Cliff Durant..... | Chevrolet special |
| Wilbur D'Alene..... | Duesenberg special |
| Dennie Hickey..... | Stickel special |

Indianapolis Entry List Lengthens

NEW YORK, April 29—A third Peugeot has been entered for the 500-mile Indianapolis event for May 31, to be driven by Arthur Klein. Barney Oldfield, although out of the racing game himself, is putting his old racing car, the Oldfield special, into the hands of Roscoe Sarles for the occasion. The complete list of cars and drivers officially entered with the Contest Board of the American Automobile Association includes:

| Drivers | Cars |
|-----------------------|--------------------|
| Clifford Durant..... | Chevrolet special |
| Dario Resta..... | Sunbeam |
| Jean Chassagne..... | Sunbeam |
| H. C. Simmons..... | Hudson special |
| J. M. Reynolds..... | Hudson special |
| Eddie Pullen..... | Hudson special |
| W. W. Brown..... | Richards special |
| Eddie O'Donnell..... | Duesenberg special |
| Wilbur D'Alene..... | Duesenberg special |
| Tommy Milton..... | Duesenberg special |
| Kurt Hitke..... | Roamer-Duesenberg |
| Jules Goux..... | Peugeot special |
| Ray Howard..... | Peugeot special |
| Arthur Klein..... | Peugeot special |
| Louis LeCoq..... | Roamer special |
| Ralph DePalma..... | Packard special |
| Earl Cooper..... | Stutz special |
| Ralph Mulford..... | Frontenac special |
| Louis Chevrolet..... | Stickel special |
| Denny Hickey..... | Thurman special |
| Arthur Thurman..... | Mesaba special |
| Elmer P. Shannon..... | Durant special |
| Eddie Hearne..... | Oldfield special |
| Roscoe Sarles..... | Oldfield special |

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:

| | |
|-----------------------------|-----------|
| Muriatic, lb..... | .02 - .03 |
| Phosphoric (85%) lb..... | .35 - .39 |
| Sulphuric (60%), lb..... | .008 |

Aluminum:

| | |
|--------------------------------------|------------|
| Ingot, lb..... | .29 - .31 |
| Sheets (18 gage or more), lb..... | .42 |
| Antimony, lb..... | .07 - .07½ |

Burlap:

| | |
|------------------|-------------|
| 8 oz., yd..... | .07½ - .07½ |
| 10½ oz., yd..... | .09½ |

Copper:

| | |
|----------------|-------------|
| Elec., lb..... | .15½ - .15½ |
| Lake, lb..... | .15½ - .15½ |

Fabric, Tire (17½ oz.):

| | |
|--------------------------------------|------|
| Sea Is., combed, sq. yd. | 1.40 |
| Egypt, combed, sq. yd. | 1.25 |
| Egypt, carded, sq. yd. | 1.20 |
| Peelers, combed, sq. yd. | 1.10 |
| Peelers, carded, sq. yd. | .85 |
| Fibre (½ in. sheet base), lb..... | .50 |

Graphite:

| | |
|---------------------|-----------|
| Ceylon, lb..... | .09 - .22 |
| Madagascar, lb..... | .10 - .15 |
| Mexico, lb..... | .03½ |

Lead, lb..... .04½ - .05

Leather:

Hides, lb..... .25 - .41

Nickel, lb..... .40

Oil:

| | |
|------------------------------|------|
| Petroleum (crude): | |
| Kansas, bbl..... | 2.25 |
| Pennsy., bbl..... | 4.00 |
| Gasoline: | |
| Auto, gal..... | .24½ |
| 68 to 70 gal..... | .30½ |
| Lard: | |
| Prime City, gal..... | 2.50 |
| Ex. No. 1, gal..... | 1.06 |
| Linseed, gal..... | 1.53 |
| Menhaden (dark), gal..... | .95 |

Rubber:

| | |
|--------------------------------------|------|
| Plantation: | |
| First latex pale crepe, lb..... | .47 |
| Brown crepe, thin, clear, lb..... | .45½ |

Smoked, ribbed
sheets, lb..... .46½

Para:

| | |
|------------------------------|------------|
| Up River, fine, lb..... | .56 |
| Up River, coarse, lb..... | .34 |
| Island, fine, lb..... | .47½ - .48 |

Shellac (orange), lb..... .60 - .64

Spelter, lb..... .06½

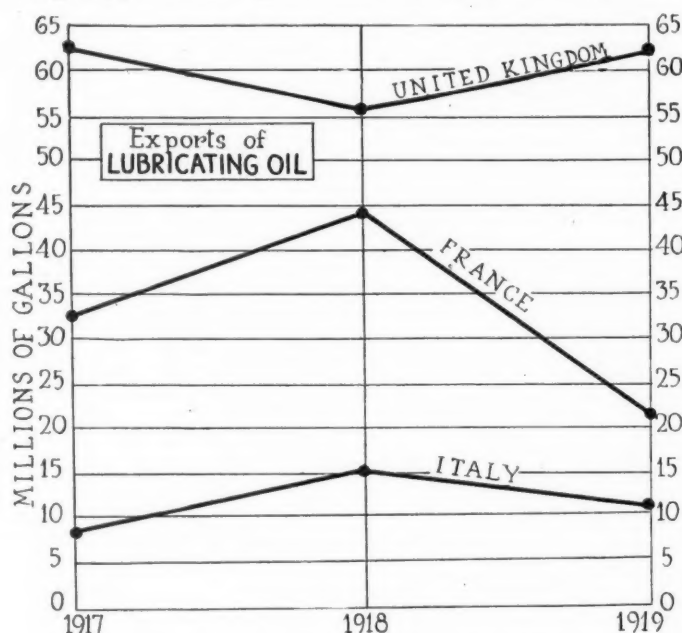
Steel:

| | |
|--------------------------------------|-------|
| Angle beams and channels, lb..... | .03 |
| Automobile sheet (see sp. table). | |
| Cold rolled, lb..... | .0625 |
| Hot rolled, lb..... | .039 |

Tin72½

Tungsten, lb..... .100

Waste (cotton), lb..... .12½ - .17



Although our exports of lubricating oil to the United Kingdom fluctuated but little during the periods covered by this chart, France's supply dropped by one-half during the last seven months as compared with the previous like period

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

| | Primes only per 100 lbs. | Primes when Seconds up to 15 per cent are taken per 100 lbs. |
|--|-----------------------------|--|
| Automobile body stock..... | \$5.95 | \$5.85 |
| Automobile body stock, deep stamping | 6.20 | 6.10 |
| Automobile body stock, extra deep stamping..... | 6.45 | 6.35 |
| Hood, flat, fender, door and apron, or splash guard stock..... | 6.05 | 5.95 |
| Crown fender, cowl and radiator cas- ing, extra deep stamping..... | 6.55 | 6.45 |
| Crown fender, cowl and radiator cas- ing, deep stamping..... | 6.30 | 6.20 |
| Automobile Sheet Extras for Extreme Widths: | | |
| Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb. | | |
| Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb. | | |
| Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb. | | |
| Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb. | | |
| Blank Sheet Extras to Apply to Narrow Widths: | | |
| Oiling, 10c. per 100 lb. | | |
| Patent leveling, 25c. per 100 lb. | | |
| Resquaring, 5 per cent of gage price after quality, finish and size extras have been added. | | |
| Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes. | | |

Automotive Securities on the Chicago Exchange at Close April 26

| Automotive Securities | | | | RUBBER STOCKS | | | |
|------------------------------|-------|--------------|-----|-----------------------------|-------|--------------|-----|
| Bid | Asked | Net Ch'ge | | Bid | Asked | Net Ch'ge | |
| Auto Body Company..... | 9 | 10 | .. | Ajax Rubber Co..... | 90½ | 92½ | +13 |
| Briscoe Motor Car com... 14 | .. | .. | | Firestone T. & R. com.... | 140 | 145 | .. |
| Briscoe Motor Car pfd... 50 | 65 | .. | | Firestone T. & R. pfd.... | 100 | 102 | .. |
| *Chandler Motor Car..... | 142 | 144 | -2½ | Fisk Rubber Co. com..... | 135 | 140 | .. |
| Chevrolet Motor Car..... | 209 | 211 | +10 | Fisk Rubber 1st pfd..... | 100 | 105 | .. |
| Cole Motor Car Co..... | 93 | 105 | .. | Fisk Rubber 2nd pfd..... | 138 | 142 | +1 |
| Continental Motors com... 8¾ | 9½ | +1½ | | Fisk Rubber 1st pfd. conv. | 105 | 110 | .. |
| Continental Motors pfd.... | 96 | 99 | .. | Goodrich, B. F., com.... | 71 | 72 | +4½ |
| Edmunds & Jones com.... | 15 | 20 | .. | Goodrich, B. F., pfd.... | 107 | 109 | +1 |
| Edmunds & Jones pfd.... | 75 | 90 | .. | Goodyear T. & R. com.... | 280 | 287 | .. |
| Electric Storage Bat..... | 75 | 77 | +6 | Goodyear T. & R. 1st pfd. | 105½ | 107½ | .. |
| Federal Motor Truck..... | 34 | 37 | .. | *Goodyear T. & R. 2nd pfd. | 106 | 107½ | +1 |
| Fisher Body Co. com..... | 59 | 61 | -3¾ | *Kelly Springfield com.... | 123½ | 124½ | +1¾ |
| Fisher Body Co. pfd..... | 92 | 94 | .. | Kelly Springfield 1 pfd.... | 95 | 97 | .. |
| Ford Motor of Canada..... | 320 | 330 | +10 | Lee Tire & Rubber Co.... | 32 | 33 | +5½ |
| *General motors com..... | 180½ | 181½ | +1 | Marathon Tire & Rubber.. | 55 | 75 | .. |
| *General Motors pfd.... | 91 | 93 | -¾ | Miller Rubber Co. com.... | 170 | 175 | .. |
| Hupp Motor Car com..... | 8¾ | 8¾ | +1½ | Miller Rubber Co. pfd.... | 102 | 104 | .. |
| Hupp Motor Car pfd..... | 96 | 99 | .. | Rubber Products Co..... | 125 | 130 | .. |
| Kelsey Wheel Co. com.... | 35 | 37 | .. | Portage Rubber Co. com.... | 158 | 162 | .. |
| Kelsey Wheel Co. pfd.... | 93 | 95 | .. | Swinhart T. & R. Co.... | 77 | 81 | .. |
| Manhattan Electric S. com. | 48 | .. | .. | U. S. Rubber Co. com.... | 87 | 88 | +1¼ |
| Maxwell Motor com..... | 39½ | 40½ | +1 | *U. S. Rubber Co. pfd.... | 111½ | 112½ | +1½ |
| Maxwell Motor 1st pfd.... | 69 | 70 | +2½ | | | | |
| Maxwell Motor 2nd pfd.... | 31½ | 32½ | +1½ | | | | |
| McCord Mfg. com..... | 34 | 37 | .. | | | | |
| McCord Mfg. pfd..... | 95 | 100 | .. | | | | |
| Mitchell Motor Co..... | 33 | 35 | +3 | | | | |
| Motor Products Corp..... | 35 | .. | .. | | | | |
| Nash Motors Co. com.... | 230 | 250 | .. | | | | |
| Nash Motors Co. pfd.... | 95 | 100 | .. | | | | |
| National Motor Co..... | 16 | 20 | .. | | | | |
| Packard Motor Car com.... | 146 | 149 | +11 | | | | |
| Packard Motor Car pfd.... | 99 | 102 | .. | | | | |
| Paige-Detroit Motor com.. | 34½ | 35½ | +5 | | | | |
| Paige-Detroit Motor pfd.. | 9 | 9¾ | +¼ | | | | |
| Peerless Motor Truck..... | 27 | 29 | +4 | | | | |
| *Pierce-Arrow M. Car com. | 50¾ | 51¾ | +¾ | | | | |
| Pierce-Arrow M. Car pfd.. | 102 | 104 | .. | | | | |
| Premier Motor Corp. com. | 5 | .. | .. | | | | |
| Premier Motor Corp. pfd.. | 75 | .. | .. | | | | |
| Prudden Wheel Company.. | 21 | 22 | .. | | | | |
| Reo Motor Car Co..... | 26½ | 27½ | +2¾ | | | | |
| Republic M. Truck com.... | 43½ | 45 | +3 | | | | |
| Republic M. Truck pfd.... | 91 | 95 | .. | | | | |
| Saxon Motor Car com.... | 7 | 9 | +½ | | | | |
| Scripps-Booth Corp..... | 21 | 25 | .. | | | | |
| Stewart Warner S. Corp.. | 92¾ | 94¾ | .. | | | | |
| Stromberg Carburetor Co. | 35 | 40 | .. | | | | |
| Studebaker Corp. com.... | 75½ | 76½ | +6 | | | | |
| Studebaker Corp. pfd.... | 94 | 97 | .. | | | | |
| *Stutz Motor Car Co..... | 56 | 57 | +1¾ | | | | |
| United Motors Corp..... | 47 | 49 | +½ | | | | |
| White Motor Co..... | 57¾ | 58¾ | +1¾ | | | | |
| Willys-Overland com.... | 32 | 33 | +2½ | | | | |
| Willys-Overland pfd.... | 92 | 93 | .. | | | | |

*Ex dividend.

Calendar

SHOWS

- May 10-17—Bristol, Va.—Tenn. Cars, Trucks, Tractors, Airplanes and Accessories. Bristol Chamber of Commerce. C. W. Roberts, Manager.
- May 15-June 1—Venezuela. National Exhibit of Venezuela.
- June 2-6—Hot Springs, Va. Convention, Automotive Equipment Assn., Homestead Hotel.
- *Oct. 15—Paris. Grand Palais, International Automobile Mfrs. Congress.
- Nov. 7-15—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.
- December—Brussels. International Automobile Mfrs. Congress.
- January—New York. International Automobile Mfrs. Congress.
- February—Chicago. International Automobile Mfrs. Congress.
- Feb. 23-Mar. 6—Birmingham, Eng. British Industries Fair.

TRACTOR SHOWS

- May 6-12—Sacramento, Cal. Sectional Tractor Demonstrations, Demonstration Field.
- June 8-14—Denver, Col. Sectional Tractor Demonstrations.
- July 14—Wichita, Kan. Automotive Committee of National Implement Assn.
- Aug. 18-22—Aberdeen, S. D. Sectional Tractor Demonstrations.
- October—Ottawa, Ont., Can. Interprovincial Plowing Match and Tractor Demonstration.

RACES

- May 1—Atlantic City, N. J.—Airplane races—Aeronautic Convention.
- May 3—Atlantic City, N. J.—Airplane races—Aeronautic Convention.
- †May 17—Uniontown, Pa., probably 112½ miles.
- May 30—Atlantic City, N. J.—Airplane races—Aeronautic Convention.

- †May 31—Indianapolis, Indian-apolis Motor Speedway Assn., 500 miles.
- *June 14—Sheepshead Bay, L. I. Speedway race.
- July 4—Atlantic City, N. J.—Airplane races—Aeronautic Convention.
- *July 5—Cincinnati, O., Speedway.
- *July 19—Uniontown, Pa. Speedway race.
- *July 26—Sheepshead Bay, L. I. Speedway race.
- *Aug. 15—Middletown, N. Y. Dirt track event.
- *Aug. 22-23—Elgin, Ill. Road race.
- *Aug. 23—Sheepshead Bay, L. I. Speedway race.
- *Sept. 1—Uniontown, Pa. Speedway race.
- *Sept. 20—Sheepshead Bay, L. I. Speedway race.
- *Sept. 27—Allentown, Pa. Dirt track event.
- *Oct. 1—Cincinnati, O. Speedway race.
- *Oct. 4—Trenton, N. J. Dirt track event.
- *Oct. 11—Danbury, Conn. Dirt track event.

†Sanctioned.
*Tentative dates.

CONVENTIONS

- April 28-May 1—St. Louis, Mo. Chamber of Commerce of United States Convention.
- May 1-June 1—Atlantic City, N. J.—Pan-American Aeronautic Convention and Exhibition—Aero Club of America, the Aerial League of America and the Pan-American Aeronautic Federation.
- May 21-24—Washington—Conference on Weights and Measures—Bureau of Standards.
- May—Washington, Pan-American Commercial Conference, Pan-American Union Building.
- June 2—Chicago, Ill.—Nat'l. Gas Engine Assn. Hotel Sherman.
- June 23-28—Ottawa Beach, Mich.—S. A. E. Mid-summer Meeting.
- Sept. 22-24—Philadelphia, Annual Convention, National Association of Purchasing Agents, Bellevue-Stratford.

King-Bugatti 16-Cylinder Aero Engine

(Continued from page 959)

The front bearing on the pump shaft is lubricated by spray from the crankcase, which collects on the shaft bushing support and drains down into a ¼-in. hole leading to the bearing. Any oil leakage from the front end of this bearing returns to the sump, any slight leakage from the rear end of the bearing is drained outside the crankcase with the water leakage from the rear bearing.

There is one water inlet to the pump, of 2¼ in. inside diameter, while the single outlet is of 2 3/16 in. diameter. Water from the pump is forced up into an aluminum pipe with one branch leading to the rear end of each of the rear cylinder blocks, water entering the cylinders at the top of the water jacket on the exhaust side. A certain amount of the water circulates through the inlet manifold jacket, the remainder filling the cylinder water jacket space.

The propeller shaft is driven through a spur gear splined to the shaft meshing with a gear on the front end of each of the crankshafts, both crankshafts turning clockwise. The propeller shaft is hollow and is carried in three bearings, a ball bearing either side of the gear and a plain bearing at the rear end.

The front gear cover, the ball bearings and the gear are assembled complete as a unit before mounting in the engine. The ball bearings are Monarch Special Width Hess Brights, being narrower than the standard bearing. The front bearing is mounted in the gear cover and takes all the propeller thrust as well as a certain part of the radial load. The rear bearing slides into a retainer in the crankcase, being free to move endwise, carrying radial load only. The hub of the gear acts as a spacer for the ball

bearings, the latter being held in position on the shaft by two nuts with a locking plate between. Mounting is such that the ball bearings and gear are easily and positively assembled, there being no danger of injuring the ball bearings by screwing the retaining nuts too tight.

Provision is made for attaching two gun control mechanisms, one at the rear end of each of the camshaft housings, driven directly from the camshafts through a slotted coupling. The tachometer drive may be taken from either end of the two camshafts. It operates at camshaft speed through a slotted coupling. When the gun control mechanism is used the tachometer drive is taken from the rear end through the same type of coupling as when driven directly from the end of the camshaft.

Timken Bearings and Spiral Timing Gears on Fords

DETROIT, April 24—The Ford Motor Co. is now supplying Timken roller bearings to Ford dealers to replace the ball bearings in the front wheels. The introduction of these bearings came with the detachable wheels, and this bearing is made interchangeable with the old type ball bearing so that the replacement can be made without changing any other parts.

The spiral timing gears which were incorporated into the design of the engine at the time the electric starting and lighting system was placed on the enclosed models have now been made standard on all the cars.

Sundstrom Now Rex Machine

CHICAGO, April 28—The Sundstrom Mfg. Co. is now the Rex Machine Co., manufacturing Rex automotive air equipment besides dies and tools.

U. S. Relaxes Cable Censorship

NEW YORK, April 28—Cablegrams from persons in the United States to Central or South America, including Mexico, Cuba and the West Indies, may now pass uncensored. The United States has also stopped censoring cable messages to or from points within British, French or Italian territory. Likewise cablegrams from all parts of the world and Central or South America are no longer censored by the United States. In addition, messages from the Far East, except those sent through Vladivostok, are not subject to American censorship.

British, French and Italian censorship, however, is still in operation, so that uncensored cablegrams from the United States are subject to the regulations of the French, Italian and British officials.

British Censorship Relaxes

WASHINGTON, April 29—Modification of British censorship, permitting the use of private code in cablegrams from the United States to South America passing through London, is announced by the Navy Department.

Mertzanoff Handles Automotive Exports

NEW YORK, April 29—C. E. Mertzanoff, formerly in charge of the export department of Mitchell Motors Co., is now acting as export manager for the American Motors Corp., Plainfield, N. J., makers of the American Six; the Seneca Motor Car Co., Fostoria, Ohio, building a 4-cylinder five-passenger car and the Piedmont Motor Car Co., Lynchburg, Va., building sixes and fours. He acts in a similar capacity for the Economy Body Sales Co., New York, makers of dump bodies for commercial cars, and the E. & W. Mfg. Co., Milwaukee.